JANUARY 21, 1961

Chemical Week

A McGRAW-HILL PUBLICATION PRICE FIFTY CENTS

AUTOMATION'S IMPACT

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War on weeds warms as new herbicides debut in New York meeting . . . . . p. 33

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TEN YEARS OF CW: GROWING IN A GROWTH

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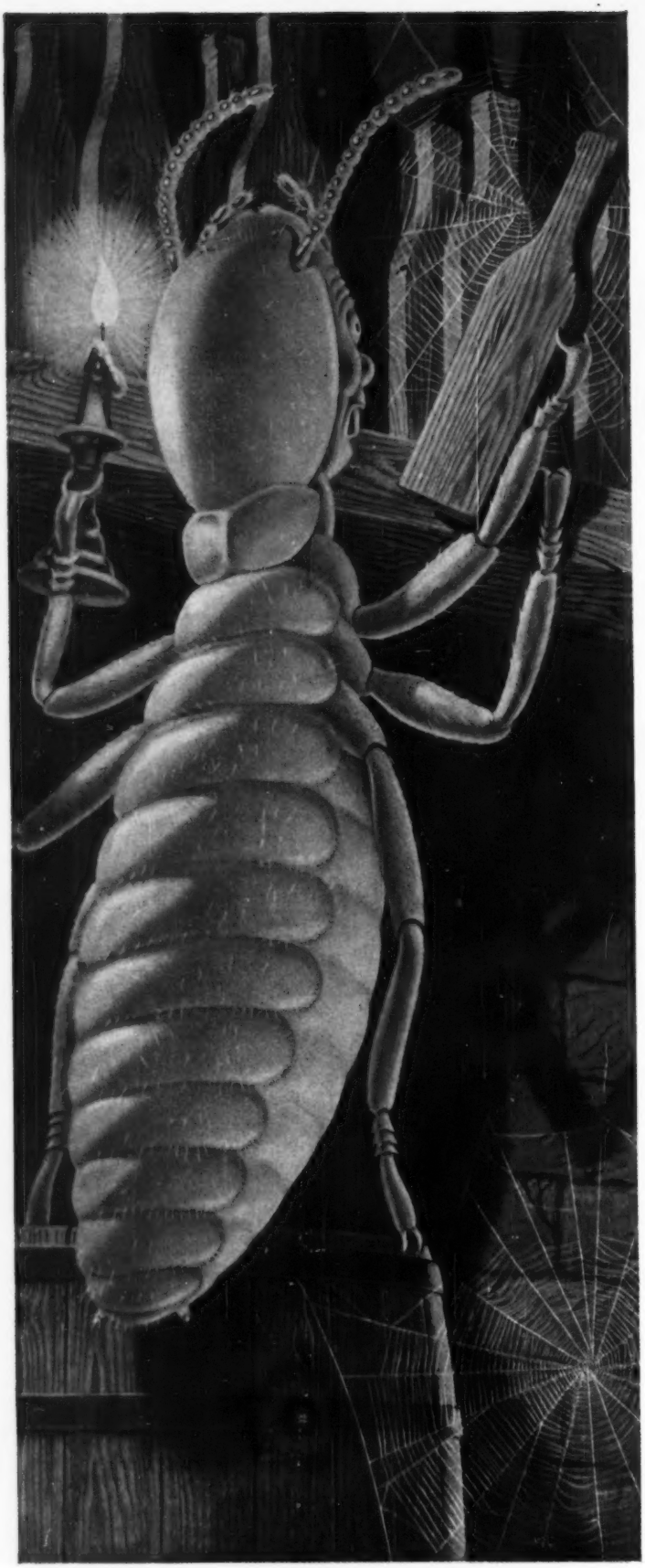

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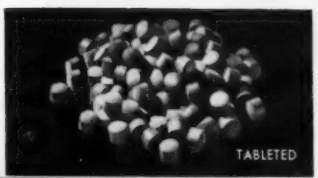

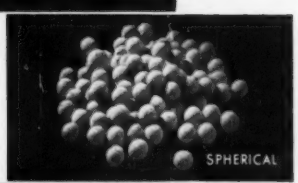

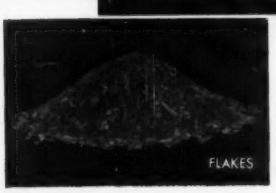

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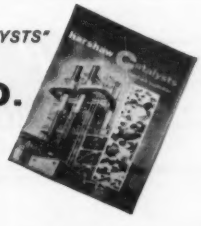

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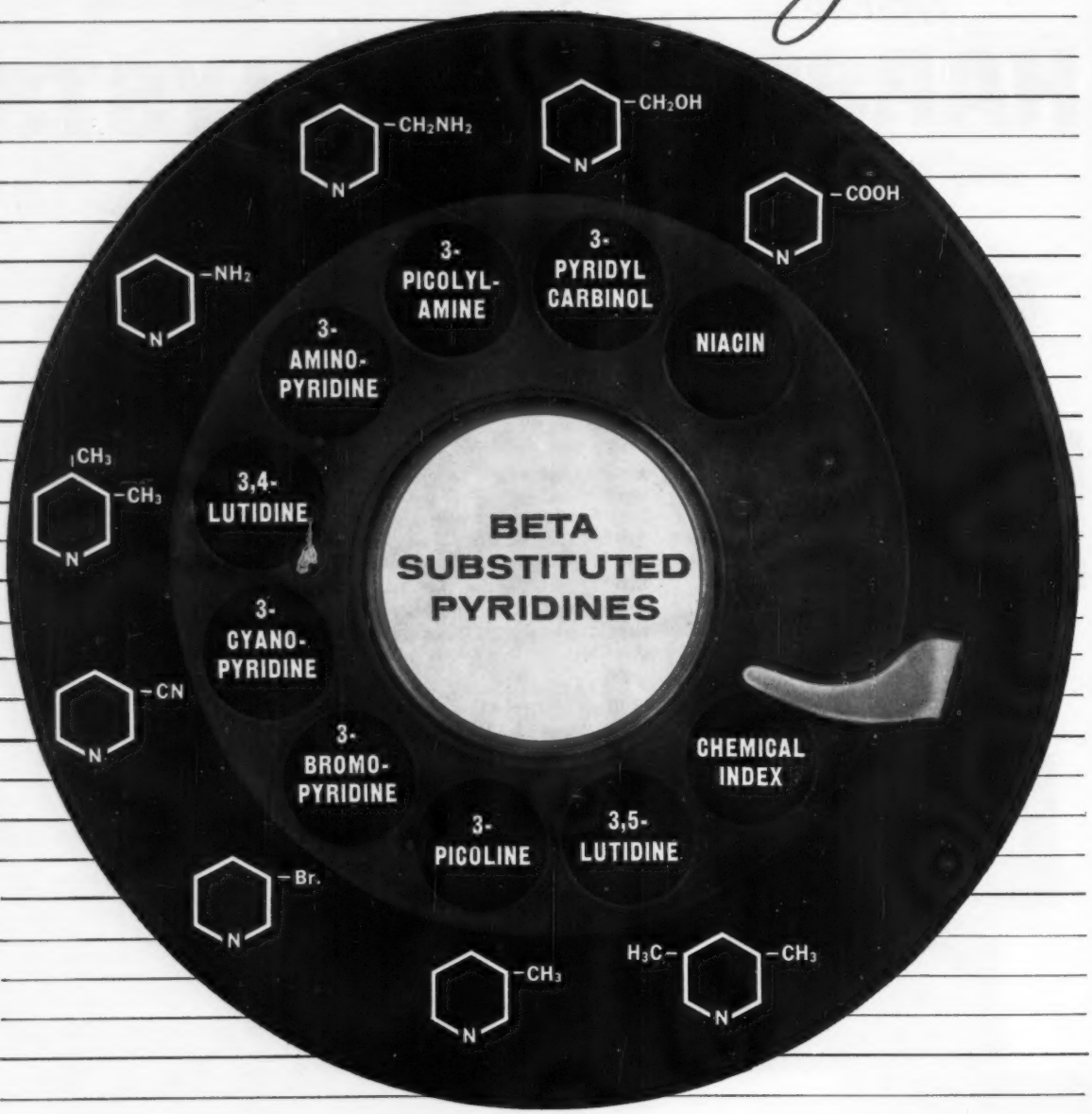

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ON THE COVER: A collage of CHEMICAL WEEK covers commemorates 10 full and eventful years of publishing service to the chemical process industries.

Chemical Week

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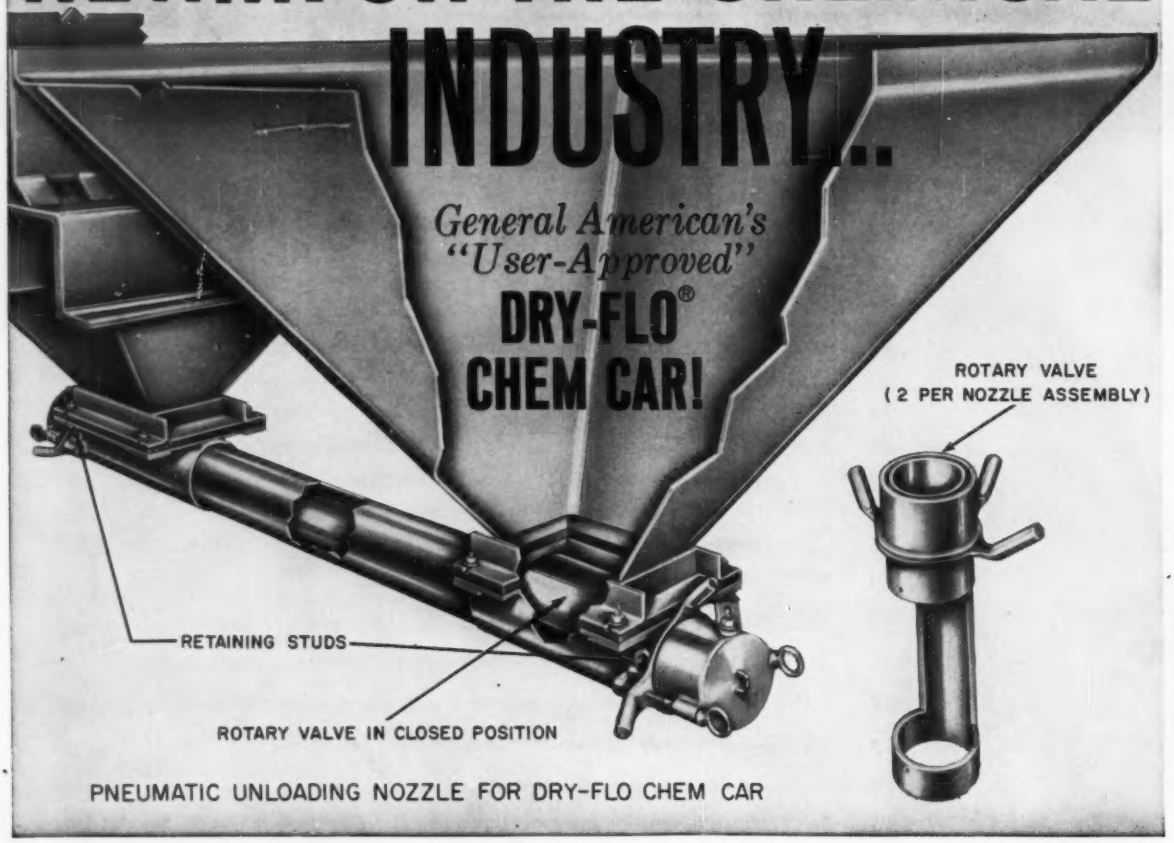

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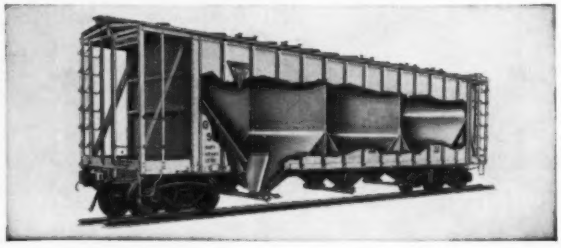

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'A Part Of and Apart'

IT WAS AN ANXIOUS MOMENT when the printer delivered the first copies of *Chemical Week*, just 10 years ago this week, to the editorial staff on the 24th floor of the McGraw-Hill Building. How effectively would the new magazine play the role created for it? How well would it be accepted?

First, let's define its role. The magazine was conceived as an interpretive news medium for management men in the chemical process industries. An "interpretive news medium" is one that examines current events, developments and trends—not only describing them but also telling what they mean, now and tomorrow, to the man who has a stake in a profit-making enterprise. A "management man" is an influence-wielder in such diverse technical and nontechnical functions as research and development, engineering, design and construction, production, purchasing, sales, and corporate management. Many nonsupervisory employees wield some influence, of course, but *CW* is edited for the needs of department heads and above. The "chemical process industries" are those segments of manufacturing whose common bond is the production or processing of chemicals and the use of chemical engineering technology. It is to the common interests of all these men in all these industries that *Chemical Week* addresses itself.

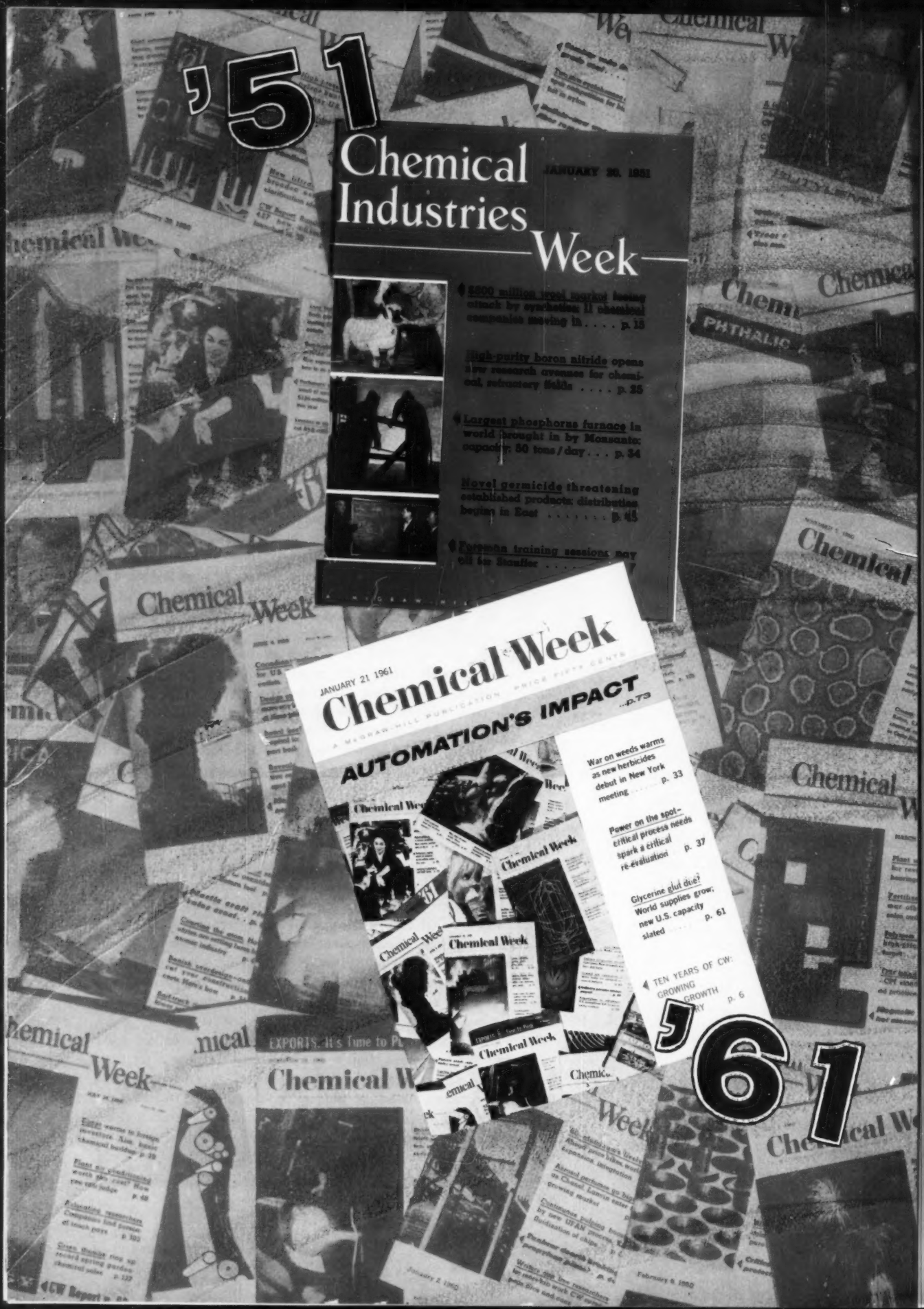
Hence *CW* is at once both broad and narrow—broad in that it ingathers news from all job areas of all process industries, narrow in that it selects out of that welter of material only that which is of common interest and universal economic significance.

How well *CW* has played its assigned role is not for us, but rather for its readers, to say. Many have praised, and many have criticized—and the criticism is most often of its role, as we see it, of interpreter.

Kipling once listed his six honest serving-men: what, why, when, how, where, and who. Now five of those are seldom troublesome, but the sixth, why, is the very core of evaluation and interpretation. Without it one has merely the bare bones of fact, unfleshed with the context of motivation that makes the facts meaningful. But in asking why, *CW* often drives its news sources out of the bright light of reason into the deceiving shadows of subjectivity. People are often prouder of their deeds than of their motives.

A company may brag, for example, that through keen foresight and careful planning, it was able to convert without a hitch from production of methylphlogiston to dimethylphlogiston. That's fine, as far as it goes, but why did it switch? Let's say that an astute reporter discovers that the company's market research went awry, that it discovered too late that it couldn't sell methylphlogiston. Nobody could sell methylphlogiston. Even though the company's plight is common knowledge among market specialists, a magazine that provides this truthful and meaningful interpretation to its readers is bound to be criticized.

There's no legitimate excuse for errors of fact or even for naive, uninformed interpretation. But a knowledgeable seeking after truth should be not only tolerated but also welcomed as a necessary path-clearing for progress. As an independent spokesman, *CW* is both a part of and apart from the industries it serves. Its own self-interest is closely bound to the interests of the industries; but we serve those interests—and our own—best by reporting fairly and forthrightly. Our steady progress over the past decade (*see p. 6*) is a heartening indication to us that our readers share that creed.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TEN YEARS OF CW: GROWING GROWTH
'61

10 YEARS OF CW

ON Jan. 17, 1951, eleven excited New York editors huddled around one of the first-off-press issues of a new magazine. It was named *Chemical Industries Week* to bridge the transition from the monthly *Chemical Industries*, and within six months it would be simply CHEMICAL WEEK. This week, in short, CHEMICAL WEEK is 10 years old.

There are any number of ways to celebrate a magazine's birthday. We could, for example, turn out a special "anniversary issue." But that would be pretentious after only 10 years. Besides, there are more important things for us to write— and you to read about—this week. In its year-end issue last month, the estimable *Life* magazine raised a toast to "nostalgia." But frankly, 10 years is not enough time to generate much nostalgia. More importantly, for a business magazine nostalgia runs a poor second to anticipation.

Over the past 10 years, however, there have been vast changes both in the chemical process industries and in CHEMICAL WEEK. And we made some explicit as well as implicit pledges in that first issue. We feel it's appropriate to review some of the changes, to recall and renew our pledges.

Born in Strife: In Jan. '51, the U.S. was embroiled in the Korean War. Processors had shaken off the '49 recession and had completed a record-breaking year. But '51 would prove even better; sales by the chemical industry segment of the CPI would rise to nearly $18.5 billion. And it was spending heavily to increase capacity; before the year was out it would invest $1.25 billion in new plant and equipment. Research expenditures were big, too. The chemical process industries (including petroleum, paper, rubber and glass) spent approximately $510 million.

But producers were facing a brand-new set of problems. They could not get equipment to expand rapidly enough. A shortage of sulfur was almost crippling. A scarcity of steel pervaded every sector of the economy. Chemical companies could not produce enough to satisfy their customers. And even if they could, they wouldn't be able to get enough tank cars or containers for their products.

Because of the war, the economy was highly government-oriented. A number of problems needed clarification, such as manpower, priorities and certificates of necessity. It was an era of alphabet combinations—DO (Defense Order), DPA (Defense Production Administration) and CMP (Controlled Materials Plan).

Time of Plenty: But the chemical industry built rapidly and well, and has been on a heady expansion spree ever since. Industry sales have increased 50% over '51's—to approximately $27.8 billion. Annual capital investment continues at a high level—$1.61 billion in '60. CPI research outlays over the same period have more than doubled, to $1.28 billion.

And the supply-demand balance is far different today. Rather than a lack of capacity, there is in most lines a cushion that's more than comfortable. The government still bulks large, of course, but its actions do not have the impact they once had on day-to-day planning.

The intervening years have witnessed some notable shifts in the make-up of the industry. Mergers and acquisitions have been accountable for a large share of the change, as when Mathieson Chemical culminated a series of moves by merging with Olin Industries to form Olin Mathieson. Petroleum companies have plunged deeper into chemicals as they have found them an attractive sideline to the oil business. Growth prospects have attracted others, too, and the decade has seen the emergence of companies such as W. R. Grace as important factors in the chemical industry.

Petrochemicals and Polymers: It's not possible to do justice to the technological changes that have taken place, but unquestionably the most significant developments have been in petrochemicals and polymers.

In Jan. '51, some of the petrochemicals were already well established. Ethylene, propylene and the butylenes were growing rapidly as basic chemical building blocks, but benzene was almost exclusively within the purview of coal. Petrochemical benzene production was at the rate of 12 million gal./year. Only one Platformer was in operation. However, eight more were under construction, and five were on the drawing board. Coke-oven benzene was selling for 21¢/gal. and petrochemical benzene was expected to sell for 51¢/gal. Today petroleum benzene rivals coke-oven benzene, sells for the same price and has caused some coke-oven producers to install Udex and hydrogenation processes to match the purity of the petroleum material.

In '51, too, practically all the acetylene was produced from calcium carbide. Now some 300 million lbs. of the total 1.3-billion-lbs./year acetylene capacity is based on natural gas, and at least another 180 million lbs. is being planned.

Petrochemical ammonia (utilizing hydrogen from natural gas or refinery streams) got its big push during the '50s. Significantly, naphthalene, the last major commodity produced solely in coke ovens, is in approximately the position that benzene was in just 10 years ago. Five petroleum naphthalene plants,

planned or under construction, have an aggregate capacity comparable to that of coke ovens.

The surge in petrochemicals has been closely tied in with polymer developments. In '51 *CW* estimated polyethylene production at 55 million lbs. In '59 it topped 1 billion lbs.—a 20-fold increase in eight years. New catalytic techniques developed by Karl Ziegler in Germany and by U.S. firms such as Phillips permitted economical production of an essentially linear polymer. Extension of these techniques by Giulio Natta in Italy and a host of industrial firms has made large-scale polypropylene production a reality. The new catalysts have also been responsible for the development of new synthetic rubbers that are virtually indistinguishable from the natural material.

The '50s saw big strides in other polymers, too. Urethanes, polycarbonates and acetal resins were introduced. Polystyrene and the vinyls attained billion-pounds-a-year stature; epoxies grew; and glass fiber-reinforced polyesters lived up to their glamorous billing. In the synthetic fiber field nylon-66 remained the kingpin, but competition from the new polyesters, the growing acrylics, and from nylon-6, became keen.

A flurry of developments in metals was touched off by needs of atomic energy and rocket programs. New instruments provided better measurement and control for chemical processing. New processes made their debut (e.g., phenol from cumene, non-electrolytic production of hydrogen peroxide). Fluid-bed processing was sucessfully adapted to such diverse operations as production of phthalic anhydride and titanium tetrachloride.

Balance of Success: Alongside the triumphs were failures, too. Coal hydrogenation, which seemed on the threshold of commercialization, is still without a plant. Underground coal gasification and production of synthesis gas from coal have been all but abandoned. Soil conditioners never lived up to their early promise. The boranes program—so exciting just two years ago—received a serious setback when the government decided to use a hydrocarbon fuel for the "chemical bomber."

Some of the disappointments had their bright side, however. The Fischer-Tropsch project at Brownsville, Tex., was abandoned. But the partial-oxidation process used there to produce synthesis gas from natural gas has been profitably put to work making hydrogen, primarily in ammonia plants.

Keeping in Step: *CW* was growing and changing with the industry. The circulation for the first issue was 13,295; the current one will be mailed to 46,070 paid subscribers. The 10-year publication record: 521 issues (there were 53 issues in '55) containing 34,192 advertising and 23,092 editorial pages (approximately 14 million words) for a total of 57,824. In '51, *CW* published 3,306 pages; last year's 6,570 pages almost doubled that figure, included the largest volume of display advertising pages in any CPI publication.

The New York editorial staff, originally 11, now numbers 33. Included in the increase: a two-man department for editorial make-up has been replaced by a copy department of three and an art department of four. The field staff consisted of three editors shared half-and-half with *Chemical Engineering*. Now it's the equivalent of four full-time editors.

The content of the magazine has been changed to accommodate trends in the industry. For instance, in '52, despite the fact that the industry was booming, it was possible to foresee the time when sales would be a problem; *CW*'s every-other-week Packaging department was broadened to a weekly Sales and Distribution department.

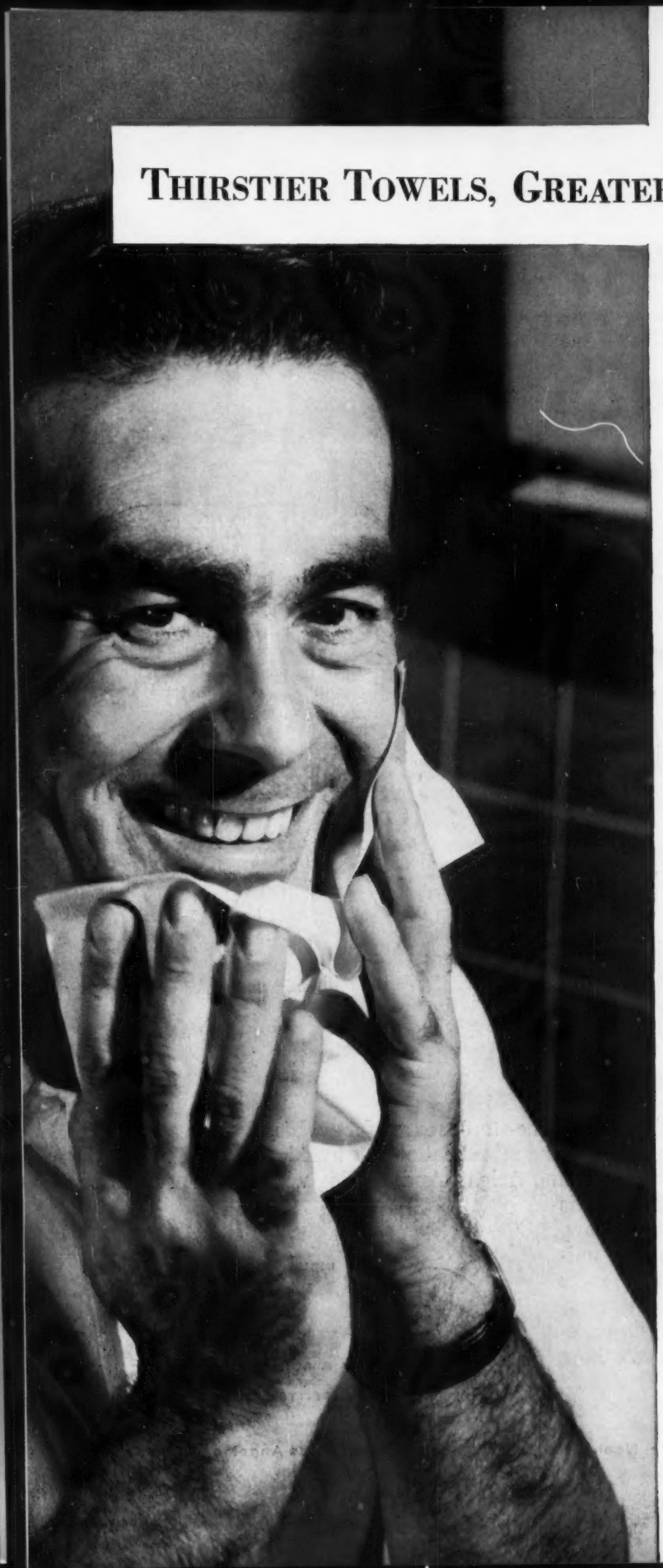
With higher research expenditures, big building programs and a general step-up in technology, *CW* broadened its coverage of that area first by adding the Technology Newsletter, then by adding the Engineering department. Similarly, increased interest on the part of U.S. chemical companies in overseas activity led to the designation of a Foreign editor.

Originally, *CW* published about 10 special reports annually. With a big, experienced staff, it is now able to publish, on the average, one every other week. And they cover a greater variety of subjects, in more depth.

Other additions have been made, too: a Washington Newsletter, bringing the total number of newsletters to four; a regular weekly editorial, in Viewpoint; and significant statistics, in Business Benchmarks.

Success and Survival: That *CW* has been successful is a tribute to a countless number of individuals, including company executives, who risked a sizable investment. But three, no longer directly connected with the magazine, deserve special mention: Wallace F. Traendly, publisher for nine of its 10 years and now a senior vice-president of McGraw-Hill; Sidney D. Kirkpatrick, *CW* editorial director until his retirement at the end of '59; and W. Alec Jordan, chief editor for the first five years and now head of his own successful public relations firm.

Now about those pledges (*see also p. 5*). In the first issue, *CW* promised that it would bring you news of business trends and technical developments that affect your interests. It promised to report and interpret the news in terms of the people and companies making the news—and to do it in language that would be understood by the technical-minded business man and the business-minded technical man. Although there have been a great many changes—in depth and breadth of reporting, and in physical appearance—there has been no change in objective: to get all the facts, interpret them knowledgeably, report them accurately, as quickly as possible. To change that purpose would bring to naught a decade's dedication.



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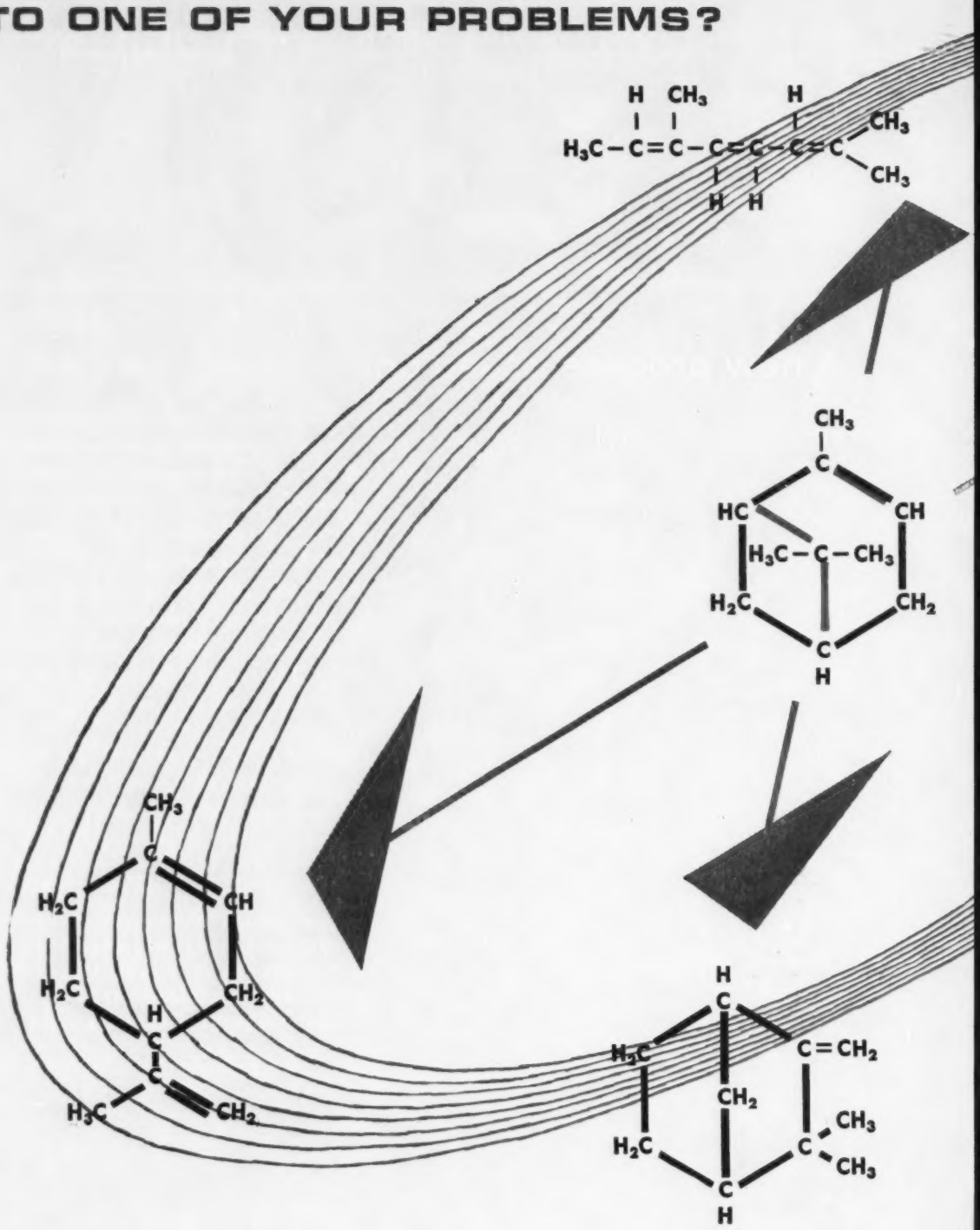

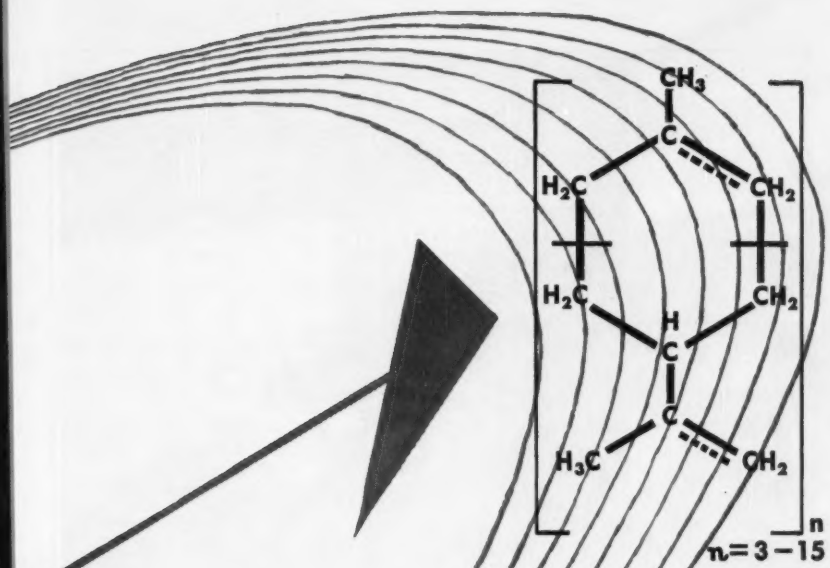

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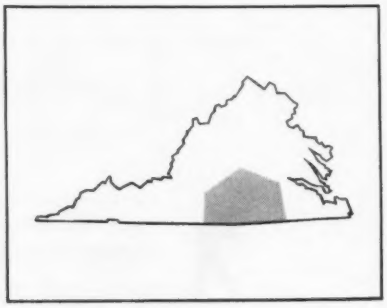

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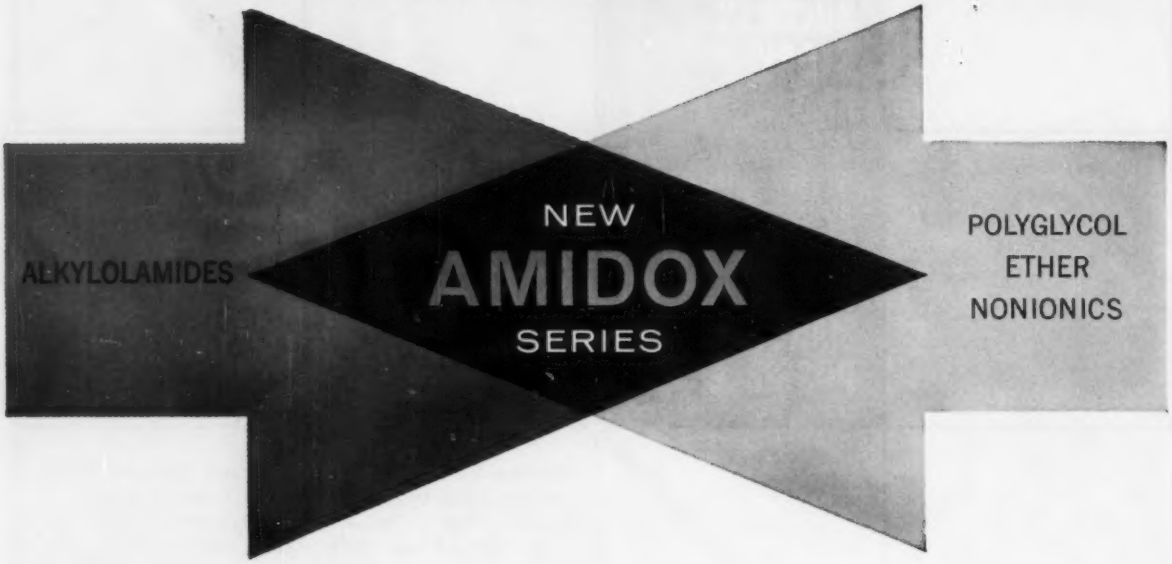

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CHEMICAL WEEK
January 21, 1961

First gauge of how chemical profits skidded in the fourth quarter: Dow Chemical's just-out financial report, covering the three-month and six-month periods ended Nov. 30, showed profits continuing their plunge. In the quarter ended last May 31, Dow's net income was $21.1 million, almost exactly equal to that of the year-ago period; in the quarter ended Aug. 31, the net was $18.5 million, down 17.1%; and in the latest quarter earnings dropped to $14.7 million, a decline of 35.4%.

Sales, however, have been holding up well. Dow's volume in the September-October-November period totaled 206.7 million—up more than 2% from the autumn quarter in '59.

•

More petrochemical expansions in the Gulf Coast region:

• Hercules Powder is starting to double the capacity of its polyolefins plant under construction at Lake Charles, La. The company's total polyolefins capacity right now is about 80 millions lbs./year (all at Parlin, N.J.). When the first unit at Lake Charles comes onstream next month, this total will rise to 140 million lbs./year; and when the newest project is completed, in Feb. '62, the total will be 200 million lbs. Each unit is designed to produce polyethylene and polypropylene—in any proportion.

• Monsanto Chemical is boosting its vinyl chloride monomer capacity at Texas City by 50%. This will bring the plant's capacity to 150 million lbs./year by July 1.

• Reichhold Chemicals is still making engineering studies on its proposed $10-million vinyl acetate monomer plant. Meanwhile, industry gossip in the Houston area is that the plant might be a big customer of the acetylene plant to be built by Tennessee Gas and Cary Chemicals on the Houston Ship Channel (*CW, Jan. 14, p. 23*). But Reichhold also is considering building an acetylene plant of its own.

• At its Baytown refinery, Humble Oil & Refining will increase benzene capacity from 30 million to 55 million gal./year, and will boost toluene capacity from 32 million to 55 million gal./year.

•

Dow Chemical seems to hold high cards in chlorinated solvents technology. It has won a $1.5-million out-of-court settlement in its patent infringement suit against Stauffer, which had originally insisted that the information in the three Dow patents in question was in the public domain (*CW, Oct. 29, '60, p. 24*).

As for action against other companies, Dow says it has "no evidence of any other infringements." However, a spokesman added, "It is Dow's policy to enforce its patent rights."

•

Further expansion in chemicals, plastics and paper—in the U.S. and abroad—will be financed by W. R. Grace & Co. with proceeds from

sale of certain assets to International Paper. For about $30 million, IPC will get most of Grace's Latin-American paper plants — including the bagasse pulp and paper mill and converting plant in Puerto Rico, the converting plant in Mexico City, and a half interest in the bagasse pulp and paper mill due to start operating soon in Colombia. But Grace will keep and expand its paper mill in Peru.

•

German chemical company sales reports reflect the peak levels of European business activity last year. As a whole, the West German chemical industry's sales increased 13% in '60. And once again the "Big Three" I. G. Farben successors are running ahead of the pack.

Farbenfabriken Bayer, Germany's biggest producer, reports sales of $666.7 million in '60—up 14%. Lumping in sales of foreign subsidiaries pushed the total to an estimated $785.7 million. Exports accounted for almost 45% of total production, compared with 43.3% in '59.

Badische Aniline- & Soda-Fabrik probably held second place, though it has revealed no figures. However, the company does say that it's satisfied with '60 results, which are reportedly above '59's $540.5 million. Exports rose from 35% to 38% of production.

Farbwerke Hoechst reports sales up 17%, to more than $619.1 million. This could put Hoechst ahead of BASF, but observers point out this is unlikely because BASF is even more disposed toward understatements than the other Farben splinters.

Chemische Werke Huels, a fourth Farben successor, boosted sales 14%, to some $167 million, a marked improvement over its '59 gain of 5.9%. But Huels still lags in export growth. While domestic sales climbed more than 19%, to $115 million, exports rose only 5%, to $52 million, slipping from 33.9% to 31% of total sales.

Schering AG. reports a 14% sales increase to $45.2 million, excluding $8.3 million in sales of Fischer-Tropsch products by the Bergkamen plant. Pharmaceutical sales alone were $28.3 million.

Reichhold Chemie says sales rose 25%, to more than $10 million.

•

Fisons has dropped out of competition with Glaxo Laboratories over bidding for acquisition of Evans Medical, contending that its own offer—which was topped by Glaxo—was based on appropriate valuation (*see p. 25*). Evans has not yet officially recommended acceptance of Glaxo's offer.

Meanwhile, Glaxo has cut prices on 29 products by up to 27%, including some penicillins and hormone and vitamin preparations. Glaxo says the cuts were made possible largely by extensive research investment, which led to cheaper production methods.

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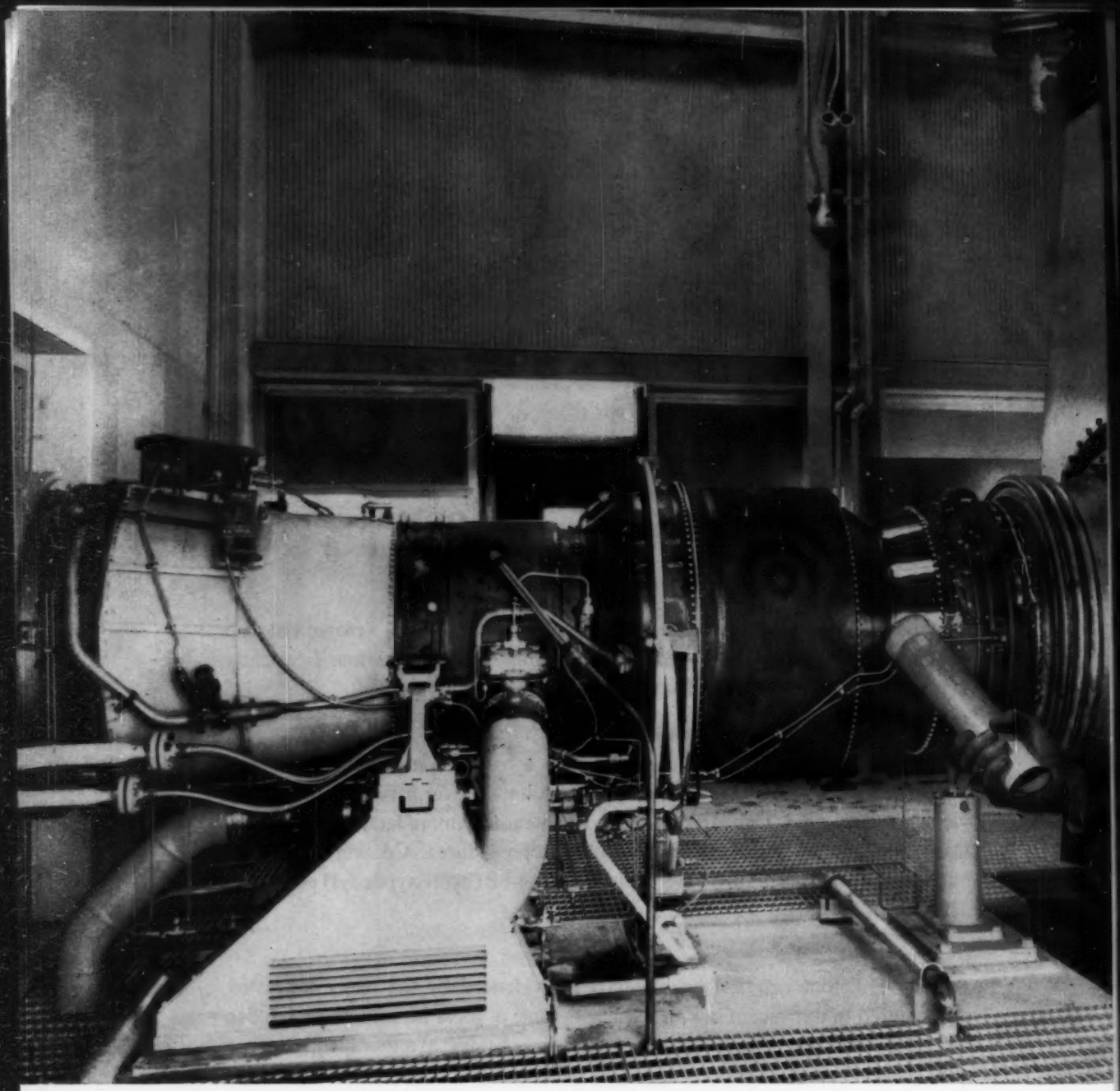

R. L. Boyer, *Vice President and Director of Engineering, and* W. B. Boyum, *Manager of Gas Turbine Sales, The Cooper-Bessemer Corporation report...*

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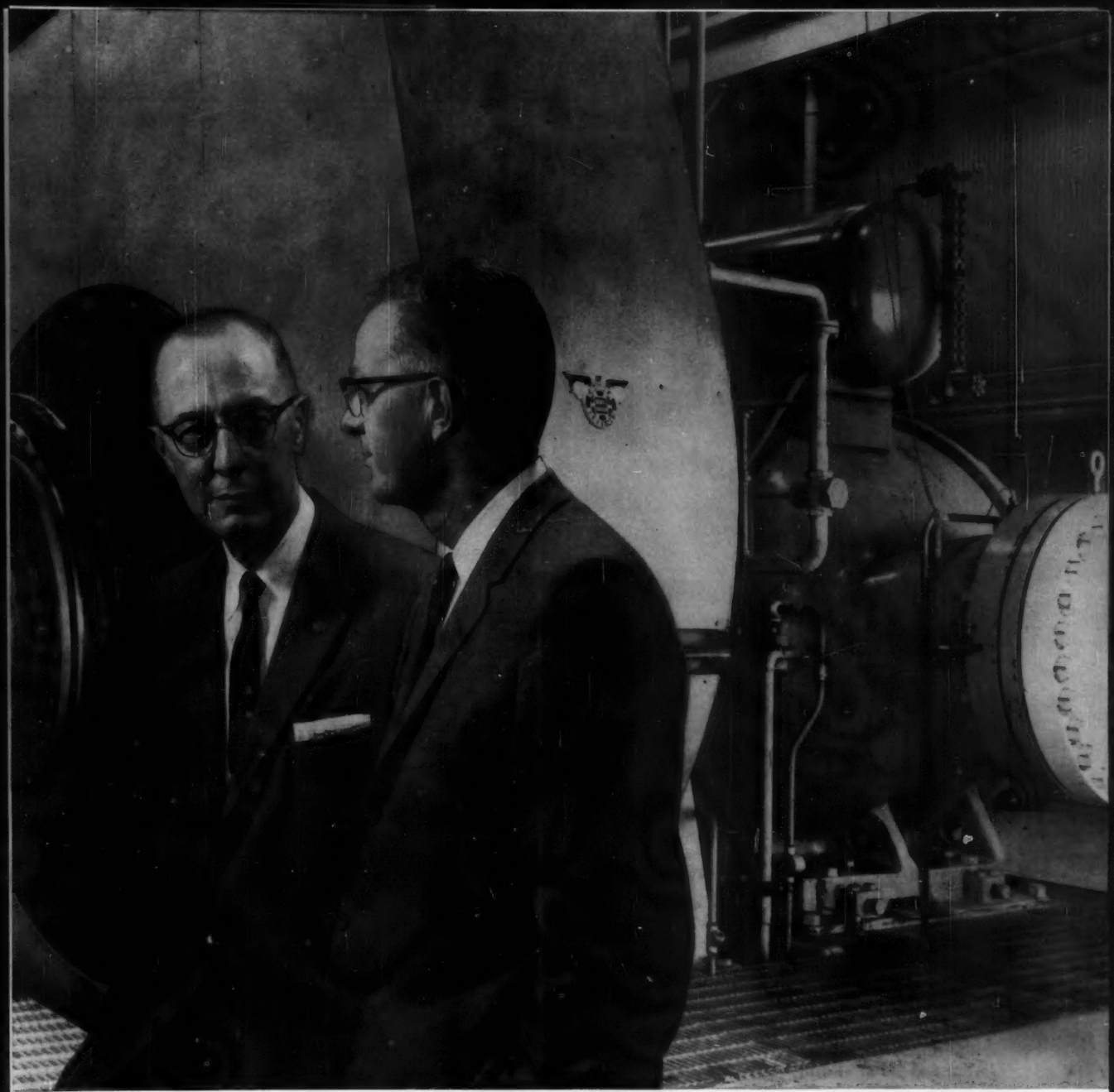

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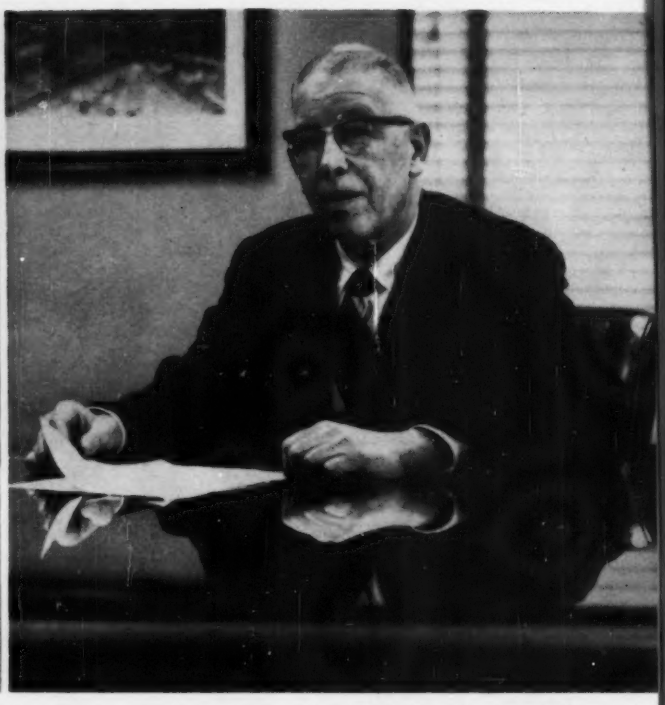


Allied's Norton, White: Their divisions are teaming up to produce, use and sell melamine crystal.

Melamine: The Field Is Filling Up

By '62 U.S. production capacity for melamine crystal will be double that of '60. That's the prospect this week, as both Allied Chemical and Reichhold Chemicals plan to start producing this material for themselves.

And two other North American companies—Monsanto Chemical and Canada's Consolidated Mining & Smelting—are believed to be seriously contemplating production of melamine from urea.

Allied Chemical's melamine project involves two of its principal divisions. Jacob White's Nitrogen Division will build and operate the new plant, to be designed for output of more than 20 million lbs./year. Frank M. Norton's Plastics Division — which last year doubled the capacity of its resins compounding plant at Toledo, O.— will use the bulk of the new plant's output and will handle the marketing of the "substantial" surplus. Allied expects the new melamine plant to be operating by early '62.

First from Urea: This project will be the continent's first commercial-scale plant to produce melamine from urea, instead of from "dicy." Allied says the plant will use a process developed by the division's own research organization, but Allied has taken out a license from American Cyanamid under what Allied calls "the basic patents covering the production of melamine crystal from urea."*

Allied's melamine process knowledge dates back to the early '40s, White tells CHEMICAL WEEK. At that time research was started at the Solvay Process Division, Syracuse, N.Y.; later the project was transferred to the company's development laboratory at Hopewell, Va. When the Nitrogen Division was formed in '52, White relates, larger budgets were allotted for continuation of this work under Frank Agel, now a divisional vice-president.

Site Not Settled: It's safe to assume that the new melamine plant will be adjacent to an Allied urea plant, but Allied isn't ready to pin down the location. The Nitrogen Division is now producing urea at South Point, O. (clear across the state from the Plastics Division plant at Toledo, about 240 airline miles distant), and at Omaha, Neb. Other Nitrogen Division plants are at Hopewell, Va., and Orange, Tex.; these plants now produce ammonia and could be expanded to include urea units. And of course it's possible that Allied may be preparing to build a new Nitrogen Division plant at some other site—perhaps near Toledo or some other Great Lakes port.

Meanwhile, Reichhold is building its melamine plant at Carteret, N. J., expects to have the first unit—a 5-

* This might mean either Cyanamid's '56 Mackay method (U.S. Patent No. 2,760,961) or Mackay's earlier findings (U.S. Patent Nos. 2,566,224 and 2,566,231, issued in '51 and also assigned to Cyanamid).

million-lbs./year semicommercial operation—onstream before the middle of this year. Reichhold's plan calls for subsequent expansion of this plant —first to a capacity of possibly 25-30 million lbs./year; later (depending, of course, on economic factors) to somewhere in the range of 60-100 million lbs./year. But Reichhold won't say anything now about its process or whether it will start with "dicy" or urea.

Pioneer Building: Cyanamid—which pioneered in the melamine field and whose Canadian affiliate is the continent's only large-scale producer of "dicy"—is now starting up a new melamine crystal plant at Wallingford, Conn., where it produces most of its melamine resins.

The new Wallingford plant, plus Cyanamid's much larger melamine-from-"dicy" plant at Willow Island, W. Va., gives the company a total melamine capacity of 100 million lbs./-year. Last week, in filing a general denial of the government's melamine antitrust charges (*CW, Oct. 15, '60, p. 24*), Cyanamid acknowledged that its '58 melamine production—all at Willow Island—was 49.4 million lbs.

Monsanto is now the No. 2 producer of melamine; its '58 output was reckoned by the government at about 9.5 million lbs. Monsanto has been researching melamine and its polymers for more than 20 years, and its Agricultural Chemicals Division produces urea in a 100-tons/day plant at El Dorado, Ark., where Monsanto's Lion Oil Co. division has a petroleum refinery. Monsanto has been buying "dicy" from Cyanamid to produce melamine for its line of Resimene resins.

Seeking Process Patent: Similar considerations apply to Cominco, whose new urea plant at Trail, B.C., went onstream late last year. Cominco is not yet a producer of melamine or melamine resins, but it has been doing considerable research in melamine production technology. It has come up with at least one process—likely based on urea—that it likes.

Melamine resins and crystal are produced in Europe by British Oxygen Chemicals (London) and Cassella Farbwerke (Frankfurt). In Japan — where melamine demand has mounted sixfold since '55—four companies are producing a total of about 18 million lbs./year. A Norwegian company has been exporting "dicy" to the U.S. and elsewhere (*CW Market Newsletter, July 19, '58*).

Allied — traditionally cautious about new ventures—says it has considered melamine production for some years "but deferred action pending development of an adequate market for melamine resins." With the new and more efficient processes expected to help melamine resins compete more vigorously against various lower-priced materials, it appears that market incentive is no longer an obstacle.

Antitrusters on the Attack

The current suit to break up the Penn-Olin joint venture and the investigation that's holding up the proposed merger of Minnesota Mining & Mfg. and Warner-Lambert herald an era of far-reaching antitrust actions. Furthermore, these moves indicate unprecedented governmental intentions to oppose two of the CPI's favorite techniques for corporate growth.

After this week's inauguration, the Democrats will take charge of both principal antitrust agencies—the Dept. of Justice (immediately) and the Federal Trade Commission (as new appointments are made to fill vacancies). They're expected to pursue these cases vigorously, try to establish precedents against corporate growth by (1) joint ventures, and (2) acquisition of noncompeting companies.

Robert F. Kennedy—the new Attorney-General — hasn't disclosed his attitude or plans on antitrust enforcement. But it seems certain that the Democrats will feel they must at least equal the Republicans' record-breaking '53-'60 performance in this field.

The charge against Penn-Olin, a joint venture of Pennsalt and Olin Mathieson to produce sodium chlorate, is based on the fact that Pennsalt is a major producer of the chemical, and Olin Mathieson is a leading consumer (*CW Business Newsletter, Jan. 14*).

The government says the venture would eliminate potential competition between Pennsalt and Olin Mathieson, eliminate OM as a customer for other producers of sodium chlorate, and would encourage "competitors in the chemical and other industries to participate in joint ventures as a means of avoiding or lessening competition." Pennsalt's reply: "Since the announcement of the $6.5-million Penn-Olin venture, other producers of sodium chlorate, anticipating increased competition, have announced expansion plans and marketing concessions."

The government's slowness in granting informal approval to a proposed merger between Minnesota Mining and Warner-Lambert indicates another new antitrust tack. Previously, no antitrust suit had ever been brought against a merger of companies making unrelated products. But the Dept. of Justice is studying this one closely, may make a case against it similar to FTC's stand against Procter & Gamble's acquisition of Clorox, producer of household bleach.

The government contended that Procter & Gamble's size (particularly its advertising outlay and soap-selling know-how) would upset the household bleach industry's competitive situation.

Attorney-General Kennedy: He'll try to equal GOP score on antitrust.

WIDE WORLD PHOTO

U.S. Borax & Chemical's Gerstley: Betting on exports and TV ads.

Bullish on Borax and Potash

In '61, U.S. Borax & Chemical Corp.—world's largest producer of borax and No. 2 U.S. producer of potash—is counting on modest gains in sales and earnings, President James Gerstley told New York financial analysts last week. And, he went on, USB&C is taking steps designed to bring substantially larger financial returns in the years to follow, with boron products contributing a growing share.

One program that's expected to start paying off this year: stepped-up television advertising of consumer products. USB&C will continue its weekly evening TV show, "Death Valley Days," and add daytime spot commercials to reach "young mothers with diaper-washing problems." These increased promotional costs will likely cut into first- and second-quarter earnings, but should start paying off by the second half of the year.

Production refinements ought to help potash sales this year; the company is equipping to produce chemical-grade potash of 99.9% purity at its potash mine and refinery (near Carlsbad, N.M.).

Gerstley also indicated that this year may be the one to decide whether to stake out claims on potash-bearing lands in Canada or to build a new $20-30-million plant at Carlsbad. This unit would be needed to process the lower-grade ores that will be left when the company exhausts its high-grade deposits.

Breakthrough on Bleach: For longer-range growth, USB&C is banking on a research program that has more than tripled in the past five years (*CW, April 23, '60, p. 95*). Achievements so far: development of a borax-stabilized, sodium hypochlorite household dry bleach (patents are expected soon); a number of new herbicidal compounds; a material tradenamed Firebrake that's already being used extensively to fight forest fires; various organo-boron compounds now being investigated by other companies; and—under U.S. Air Force research contracts—considerable work on boron polymers.

Concerning the boron polymer project, management says only that "we feel good progress has been made and that success would have wide commercial application."

Outgaining the GNP: Gerstley pointed out to the financial analysts that USB&C's 8½% growth rate since '33 has been nearly twice the growth rate of the country's gross national product. In fiscal '60 (ended Sept. 30), sales rose 7%, to $66.7 million, and net income mounted 14%, to $6.9 million.

His prediction of further gains in fiscal '61—despite currently lagging business in some of the industries USB&C sells to—is based on a belief that borax exports "will continue at a good level" and that "the outlook for potash is the best in several years."

Gerstley indicated that borax and borate products now account for 75%—or about $50 million—of the company's total sales. This would put the potash share at 25%—just short of $17 million. In '56 the company's sales ratio was 65% borax, 35% potash; in '55, it was about 55% borax, 45% potash. He said USB&C produced 74% of total '59 U.S. borax output—about 900,000 tons. The second-largest producer's share was 20%. Back in '33, USB&C and the No. 2 producer accounted for 56% and 32%, respectively, of the 160,000-tons/year U.S. total.

Top Grades Running Low: Executive Vice-President Hugo Riemer, sharing the platform with Gerstley, confirmed that the higher grades of potash in the Carlsbad area—averaging 20-25% K_2O—"are now approaching exhaustion." The company's lower-grade deposits there "should have a life in the neighborhood of 25 years."

"Indications are that European potash reserves are diminishing and that potash may be short, or at least tight, in world markets until large production capacity is established in Canada," Riemer declared (*CW, Oct. 15, '60, p. 89*). "It could well be that, before the end of our generation, Canada will become the principal world source of potash."

Riemer says USB&C has been doing exploratory work in the Canadian potash regions and has permits covering certain "promising areas."

Over the long term, Gerstley is optimistic for both of his company's major products, but he's particularly bullish on borax. He foresees continuing growth in world demand for borax products and suggests that sales growth may outpace tonnage growth as increasingly complex and, hence, higher-priced products are developed.

He regards it as "improbable" that anyone will discover new borate deposits superior to USB&C's great open-pit mine at Boron, Calif., whose ores (of about 70% purity) are expected to last 100 years. Gerstley anticipates that world and U.S. potash demand will grow with population and agricultural needs, but "it is possible there may be periods of oversupply and price weakness when major new production enters the market."

New Entry in Fumaric

Heyden Newport is about to give U.S. fumaric acid capacity a hefty boost. It has started construction of an 8-million-lbs./year plant, due on-stream the second quarter of this year, at Garfield, N.J.

Rights to the Scientific Design process have been obtained for the plant. The acid will be made from maleic anhydride produced in the company's new 24-million-lbs./year plant, which will go onstream at Fords, N.J., within the next three months.

Heyden Newport's fumaric output will go into synthetic resins, paints and varnishes and other industrial chemicals. The company will probably also produce a purified food grade later.

The fumaric plant is one of seven new plant starts for Heyden Newport within the past year *(CW, Dec. 10, '60, p. 25)*. Two have been placed onstream since last November, and four more, including the maleic anhydride plant, are due in during the first quarter of this year.

Bzura's Boast: Choosing the same week HN did for announcing its plant, Bzura Chemical began calling itself the world's largest basic producer of fumaric. Some industry opinion holds that the largest producer of both maleic anhydride and fumaric acid is probably Monsanto. Outsiders estimate Monsanto's fumaric acid capacity at considerably more than 10 million lbs./year. Capacity of Bzura's new plant is believed to be in the neighborhood of 12 million lbs./year.

New Tire Rayon Bid

A new Tyrex rayon tire cord developed by Industrial Rayon Corp. is claimed to be 10% stronger than any now available, but probably won't help rayon recover any of the market lost to nylon—because new nylon cord is also improved. The new cord should, however, keep rayon from losing any more ground for a while.

The new cord is still of what the industry calls "super-2" quality, doesn't quite make the "super-3" for which the industry has recently been aiming. It misses the higher rating, the tire industry figures, because the strength increase is all in the area of tensile strength, with none in fatigue resistance. The newcomer will be sold at regular prices in all deniers for car, truck, and bus tire use.

One major spur for the development of a stronger rayon cord: increasing pressure from Detroit for cheaper 2-ply instead of 4-ply tires. The 2-plys will go on compact cars this year.

Bid Battling in Britain

Two major British companies have locked in a new battle for control of another firm. The contenders: Fisons, Ltd., chemical and fertilizer producers, and Glaxo Laboratories Ltd., a drug and baby food maker. The prize: Evans Medical Supplies Ltd., medium-size, 150-year-old producer of pharmaceuticals and biochemical products with subsidiaries in the U.K. and 10 countries overseas.

Fisons, which has been trying to expand and diversify its food and drug interests since '59, offered to buy up Evans on Jan. 4 for shares and cash valued at $18.9 million. Two days later Glaxo jumped in with a $23.5-million counterbid.

Fisons has a history of successful merger operations—since Sir Clavering Fison became chairman of the family firm in '29 it has absorbed more than 35 fertilizer companies. But if Fison is unsuccessful in his bid for Evans, it would be his third defeat since he proclaimed his diversification program. In Dec. '59, Switzerland's Nestle Alimentana beat his attempt to gain control of Crosse & Blackwell, a food processing firm. And last February he was outmaneuvered in a takeover attempt for British Drug Houses by the latter's board.

Glaxo is less merger-minded—its last acquisition was Allen and Hanbury's Ltd. in '58. Trade observers see Glaxo's bid simply as a logical move toward strengthening its pharmaceutical interests in the face of stiffening competition.

Evans, appointed distributor of U.S. polio vaccine, is a tempting plum. It's known for its excellent distribution system and healthy profit record. A Glaxo-Evans merger would produce the largest British-owned pharmaceutical producer.

By week's end Evans' board had recommended accepting Glaxo's offer, but there was still time for Fison's to make a counterbid.

Test for 'Buy American'

Exporters are keeping a sharp watch on the International Cooperation Administration's upcoming $30-million purchase of fertilizers for Korea. It's viewed as something of a test case for President Eisenhower's "Buy American" directive and a possible precedent-setter for future foreign aid purchases. Bidding opens about Feb. 2.

ICA, a U.S. government foreign aid agency, has said it will give U.S. suppliers preference on an $18-million Korean-government segment of the order. But it still has not decided on how large a preference, and it will not "tie" the rest of the purchases, which will go to small commercial Korean buyers. Reason: ICA says it would be difficult to fill the order in the U.S. at reasonable prices within the seasonal deadline. Reportedly also behind the ICA policy is the feeling that small buyers can ill-afford to pay the high prices asked by U. S. suppliers.

The "Buy American" order could spell some big business for U.S. producers. In fiscal '60, ICA offshore purchases totaled $43.7 million for chemicals and related products and $45.6 million for fertilizers.

But the Kennedy Administration is expected to rescind the policy—or at least let it die quietly—because it would raise foreign aid costs, invite retaliation from other suppliers of foreign aid, and dim chances of getting them to share more of the aid burden.

Plastics for Yugoslavia

Foster Wheeler Corp. has won a contract to provide mechanical engineering and supervise construction of the $35-million petrochemical complex at Zagreb, Yugoslavia. The project is being financed by the U.S. Development Loan Fund, British interests, and the Yugoslav government.

Capacity of the eight-plant complex will include polyethylene, 10,000 metric tons/year; styrene, 10,000 tons; polystyrene, 4,000 tons; phenol, 6,000 tons; acetone, 3,500 tons. It will also produce desulfurized benzene, cumene and ethylbenzene.

Engineering has already begun, and the plants are due onstream in 22 months.

national roundup

Rounding out the week's domestic news.

Companies

Reynolds Metals Co. has decided to continue operations at its Arkadelphia, Ark., plant after declaring two months ago that it would be shut down. Following a meeting with Arkansas Governor Orval Faubus and other officials, company President Richard S. Reynolds, Jr., said the plant will not be closed but that its operating rate will be cut from the present 50% of capacity to 25%.

Reynolds said the reason for its moves is simply that "the company can't sell the aluminum." Earlier there were reports that the move was forced by high power and fuel costs.

Eli Lilly & Co. (Indianapolis) has merged two subsidiaries, Diamond Plastics Industries (Roanoke, Va.) and Paper Package Co. (Indianapolis) under a new company name, Creative Packaging Inc. The merged firms both produce plastic containers, and Paper Package also makes paper packaging products.

National Starch and Chemical Corp. (New York) is negotiating acquisition of Kleen-Stik Products (Chicago), a manufacturer of pressure-sensitive papers, foils and films. If the proposed transaction is approved by Kleen-Stik stockholders, Kleen-Stik will operate as a wholly owned subsidiary under its present management.

Socony Mobil Oil Co. (New York) has strengthened its liquefied petroleum gas position in the Midwest and South with the purchase of the assets of Anchor Petroleum Co. (Tulsa, Okla.).

Expansion

Chemical Charcoal: Island Creek Coal Co. (Red Jacket, W. Va.) is moving into the chemical industry with the construction of a $600,000 chemical charcoal processing plant. This plant—described as "completely automatic" and scheduled to be onstream in May—will produce catalytic charcoal for sale to Union Carbide Chemicals Co. Designed to permit what the company calls "indefinite expansion," the new plant is said to be only the fifth of its type in the world.

Petroleum Coke: Champlin Oil & Refining Co. (Enid, Okla.) has awarded a $1.5-million contract to Fluor Corp. (Los Angeles) to convert an existing thermal catalytic cracking unit into a delayed coker. Expected crude oil input capacity: 4,000 bbls./day.

Barium Compounds: Pittsburgh Plate Glass Co. will halt production of barium compounds at its South Charleston, W. Va., plant with the completion of its expansion program at New Martinsville, W. Va., late in '62. The new plant will ultimately produce barium carbonate, barium chloride and barium oxide, which are now being made at South Charleston. Some production units at the Charleston plant will be maintained for production of sodium sulfide, sodium sulfhydrate and carbon disulfide.

Paints: Glidden Co. expects work to begin on its new multimillion-dollar paints plant at Carrollton, Tex., within a week or two. The plant site has been cleared, but wet grounds have delayed start of construction.

foreign roundup

Rounding out the week's international news.

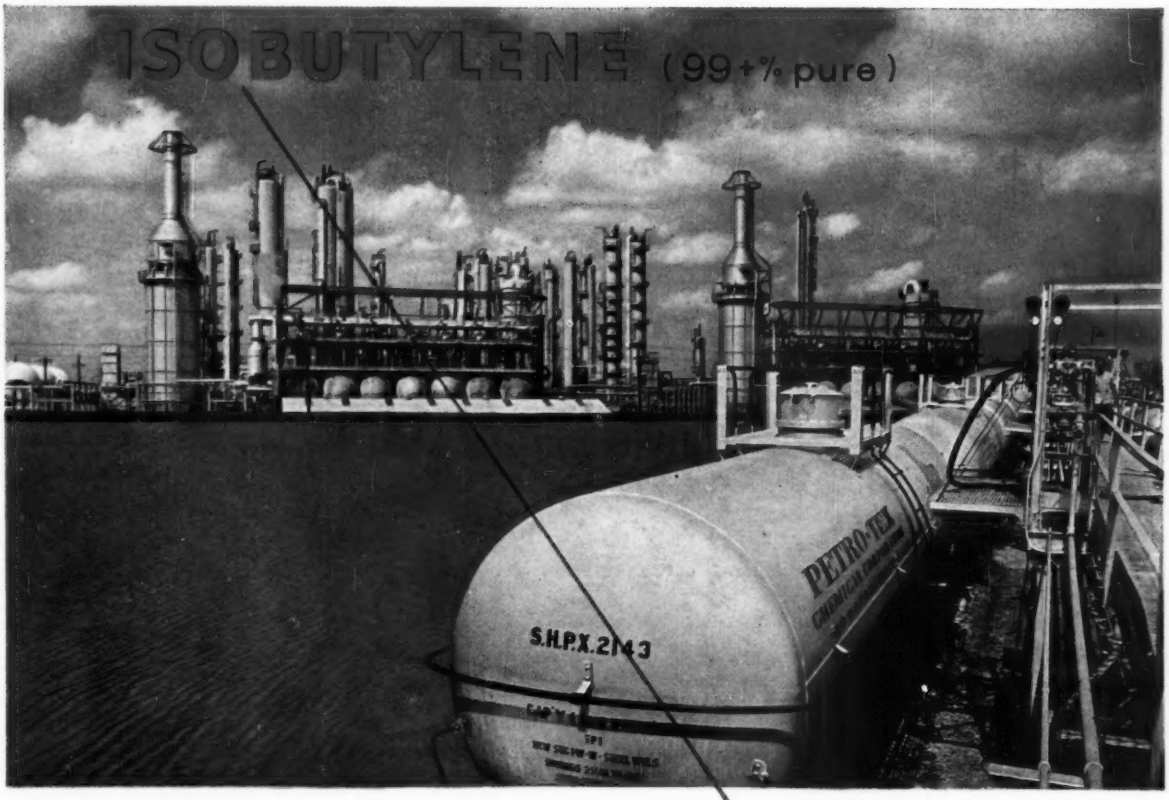
Polyethylene/England: Monsanto plans another expansion of its Fawley polyethylene plant, adding 50% to the unit's present capacity of more than 17,000 long tons/year. Onstream date: early in '63. Despite some below-capacity operations, all major British producers are expanding, and total U.K. capacity is expected to top 150,000 long tons/year by the end of '61.

Merger/Japan: Merger plans of Mitsubishi Chemical and its offshoot, Mitsubishi Petrochemical, have been moved closer to fulfillment by an agreement between the two companies. But the question of how to handle the 32% interest in Mitsubishi Petrochemical owned by Shell and its subsidiary, Showa Oil, is still being negotiated. Mitsubishi Chemical, until now a coal chemical company, plans to build a $12-million petrochemical plant.

Chemical Show/Germany: Some 23 U.S. companies are expected to be among the 1,250 exhibitors at Achema, the German Chemical Engineering Congress and Exposition, June 9-17 at Frankfurt.

Petrochemicals/Israel: A group of unidentified foreign investors will put some $17.5 million into three petrochemical plants slated to go up near the Haifa oil refineries. Details have not been revealed.

New Horizons for



Petro-Tex Isobutylene finds ever-widening use as a starting material for new and improved end-products. Typical relatively-recent applications (which may suggest equally interesting new developments) include:

In conjunction with stereospecific catalysts, to make high molecular weight polyisobutylene resins. Blends of these polymers with certain polyethylenes and polypropylenes result in improved end-products (for instance: more flexible, high dielectric strength cable coatings).

To make high-purity, low molecular weight polyisobutylene viscous liquids (frequently called polybutenes). Addition of high-purity isobutylene to the feed stock substantially improves product quality.

As a starting material for tertiary butyl derivitives.

To make copolymers of polyisobutylene with butadiene, acrylonitrile, styrene and other monomers, as indicated in the literature.

Petro-Tex has major continuous non-captive Isobutylene production which is now supplying a substantial part of current chemical industry requirements.

SEND FOR "FAMILY TREE" CHART

To facilitate research on other new uses for Petro-Tex Isobutylene, we offer an Isobutylene "Family Tree" chart showing present uses and all reported reactions having new-product significance. A bibliography of 213 references is keyed to this very useful chart.

We will also be glad to furnish specifications, price and delivery quotations on Petro-Tex Isobutylene and

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Washington
Newsletter

CHEMICAL WEEK
January 21, 1961

Improved enforcement of food and drug laws is implicit in President Eisenhower's final budget, covering the fiscal year beginning next July 1. He is asking for $23.4 million for the Food & Drug Administration, up from the estimated $19.5 million this year.

Most of the increase would go to FDA's investigative and regulatory functions and will continue what Eisenhower calls "a long-standing policy of strengthening this agency." Incoming President Kennedy and Abraham Ribicoff, his Secretary of Health, Education & Welfare, can be expected to speed this move.

Eisenhower also makes three recommendations to strengthen the antitrust laws:

- Require large companies to notify the government in advance of planned mergers. This has been rejected by Congress earlier.

- Authorize the Federal Trade Commission to seek preliminary injunctions when it is likely that a proposed merger would violate the law.

- Empower the Attorney General to issue subpoenas in civil antitrust cases, a power he already has in criminal cases.

An increase in the staff of the Justice Dept.'s Antitrust Division also is indicated in the Eisenhower budget. He seeks $5.3 million for division salaries and expenses in fiscal '62, compared with $4.9 million during the current year.

•

Extension of federal antidiscrimination contract policies to the entire area of grant-in-aid programs is recommended by President Eisenhower's Committee on Government Contracts. The committee says it has had the active cooperation of firms such as Dow Chemical, Ford Motor, P. Lorillard, Southern California Edison, Wyandotte Chemicals, General Motors, Lockheed Aircraft and Armour.

The committee's final report under Vice-President Nixon describes discrimination as America's "most destructive social and economic problem." The group, established by Eisenhower in '53 to administer the nondiscrimination clause in government contracts, will be headed by Vice-President Johnson.

Most of the problems faced by the Nixon committee have been in Southern plants, some of them chemical. But the group has checked complaints from all sections of the country. Johnson has let it be known he will press for even stricter compliance. This is perhaps mostly because he is identified as a Southerner, which was the chief factor in his loss of the Presidential nomination last summer.

Substantial progress has been made in the past seven years, the Nixon committee says, but even more could be accomplished if the principle of equal job opportunity were extended to:

• Grant-in-aid programs with particular reference to those involving education, training, recruitment or referral.

• Programs where federal subsidies are involved in housing.

• Agreements under which the federal government contributes money to state and local programs.

•

Tax reforms to promote economic growth are now virtually ready for submission to Congress—should the Kennedy Administration feel that the time is ripe. And that time may not be far off. The unemployment rate hit 6.8% in December, still moving up.

As soon as the jobless level reaches what is considered the political breaking point of 7%, which it is likely to do this month, the AFL-CIO will bring pressure on the White House for the tax cut on individuals proposed by Professor Paul A. Samuelson of MIT (*CW Washington Newsletter, Jan. 14*).

Of at least equal importance to business is a proposal by a task force headed by Professor Stanley Surrey of Harvard Law School. One important recommendation would reduce a company's tax liability if its investment in new plant and equipment exceeded its allowable depreciation deduction in a given year.

This, Surrey and his associates feel, would spur expansion, not merely replacement of existing plant and equipment. They also believe it would permit the President a more flexible approach to the problem than the more traditional proposals to increase depreciation allowances.

Surrey does not recommend a tax reduction on the total investment exceeding the depreciation allowance, but only a percentage of it. This percentage "investment credit" could be raised or lowered as the President determines the need to spur or retard capital investment.

•

FD&C Red No. 1 has been cleared for external use in drugs and cosmetics by the Food & Drug Administration. The most common use is in lipsticks. It will be redesignated as D&C No. 15.

The compound, a water-soluble coal-tar coloring, was banned in November after preliminary tests indicated liver damage to animals. FDA says further tests have proved no danger when the compound is used externally.

The Toilet Goods Assn. had petitioned FDA to clear the substance for external use, at least provisionally. Additional experiments are being conducted to determine whether internal use might be capable of causing cancer in animals.

•

The Atomic Energy Commission has a scientist member. Glenn Seaborg, a Nobel Prize winner and currently Chancellor of the University of California, this week was named chairman of AEC.

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U.S.I. CHEMICAL NEWS

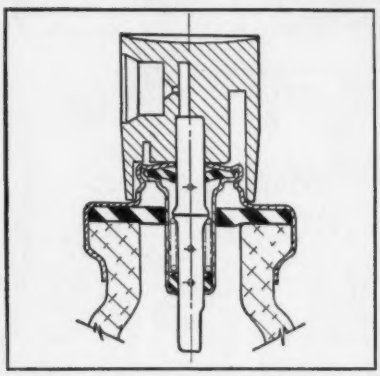
January 21 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1961

New Filling Technique Spurs Use of Metered Valves for Aerosols

In recent months a practical, volume-production method has been developed for pressure-filling aerosol containers through metering valves. Advantages claimed for pressure-filling over cold-filling techniques for metered valves: water-based systems can be handled; no danger of chemical change caused by cooling. As a result, it is felt that the new technique will lead to more widespread use of metered aerosols, particularly for drugs and cosmetics.

A metering valve has two ports—inlet and outlet. When the actuating button is pressed, both ports are operated. The inlet port closes to shut off the product in the container. The outlet port opens to let the product trapped in the valve expand and

MORE



Cross-section of metered valve shows 2 lower ports for pressure filling. (Diagram courtesy of Emson Research)

New Data Sheet on Diethyl Carbonate Offered by U.S.I.

Specifications, properties, commercial information, typical reactions and uses of diethyl carbonate are detailed in a new technical data sheet just released by U.S.I. The material is a medium evaporating nitrocellulose solvent having mild odor, good stability and extremely low acidity. It is considered as nearly neutral an ester solvent as it is possible to make.

Diethyl carbonate is also used as a solvent for synthetic and natural resins, and lacquers such as those required for coating the cathodes of radio tubes. The material is also employed for organic syntheses.

For a copy of the new data sheet, contact your nearest U.S.I. sales office or Technical Literature Dept., U.S.I. Chemical News, 99 Park Ave., New York 16, N. Y.

U.S. Anhydrous Ammonia Production Up 10% in 1960

Versatile Chemical Employed in Agriculture, and by Industry in Wide Range of Operations from Drug Manufacture to Explosives.

The U.S. Department of Commerce reports that in the first six months of 1960, 2.5 million short tons of synthetic anhydrous ammonia were produced in this country—10% more than in the same period in 1959. This increase brings production up 80% since 1954. It reflects the growing importance of the material, not only for fertilizer purposes, but for a wide range of industrial operations as well. Most important industrial uses include:

Ammonia in Chemical Processes

Ammonia is important in the production of pharmaceuticals such as sulfa drugs, vitamins, antimalarials, amino acids.

Petroleum refiners employ ammonia to neutralize acids in oil to protect equipment from corrosion. For this purpose it is low-cost, has a high diffusion rate in oil, and neutralizes acidity without forming water. Products of neutralization are easily eliminated and excess ammonia can be removed by aeration. It can be introduced into equipment by its own vapor pressure.

Ammonia in Explosives

The explosives industry is one of the largest industrial consumers of ammonia. Nearly all industrial and military explosives contain nitrogen derived from ammonia by way of nitric acid or amines.

Ammonia in Textiles and Plastics

Rayon makers use ammonia to produce ammoniacal copper hydroxide solutions for dissolving cotton linters. In nylon manufacture, it is a raw material for hexamethylenediamine. It also plays a part in making acrylonitrile fibers.

The plastics industry employs ammonia in producing urea formaldehyde resins, and for making hexamethylenetetramine—catalyst and pH control agent in production of phenol—and urea-formaldehydes.

Ammonia in Pulp and Paper

An increasingly important application for ammonia is its substitution for lime in bisulfite wood pulping. It is claimed that ammonium bisulfite produces pulp of better quality, greater yield, reduces steam consumption, and makes possible the use of some hardwoods previously considered unuseable. Conversion is inexpensive.

Ammonia in Metal Working

The most important use of ammonia here is in case hardening of steel by nitriding. Ammonia vapor is passed over steel parts in a furnace at 900° - 1,000°F. It dissociates, producing "active"

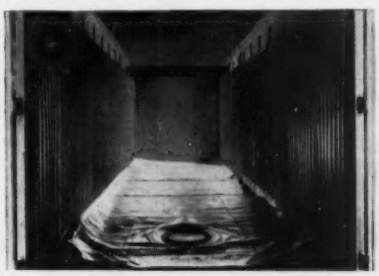
MORE

Polyethylene Liners in Collapsible Containers Used to Haul Bulk Liquids

Disposable polyethylene liners are now being used within large collapsible containers to haul liquids which must be kept free of contamination in transit. Recently introduced for carrying edibles such as milk, fruit juices and vegetable oils, the lined containers have possibilities for many other raw materials as well.

These containers can be carried on any van or flat-bed trailer, including refrigerated vans, it is reported. They come in 22-, 30-, or 34-foot sizes, with capacities of 2,750, 4,000 and 4,600 gallons.

To free the vehicle for transporting dry freight following delivery, the disposable polyethylene liner is removed and the container is rolled into a compact package. For reuse, the container is unrolled on the floor of the vehicle and inflated. A new, sanitary polyethylene liner is then easily spread within the container and also inflated.



Collapsible container is unrolled on floor of trailer, inflated with low-pressure air.

Polyethylene liner is spread inside and inflated, and container is ready for loading.

CONTINUED *Ammonia*

nitrogen which reacts with steel to form a hard layer that resists wear at operating temperatures up to 750°F.

Ammonia as Refrigerant

Ammonia is one of the oldest and best refrigerants, and the most widely used in large installations. Advantages include low cost, low power consumption, low friction and vapor density, and high heat of vaporization.

Ammonia for Water Purification

In industrial and municipal water supplies, ammonia and chlorine in about a 1:4 ratio form mono and dichloramines which are delayed sterilizing agents. They permit higher residual chlorine concentrations without chlorine taste and odor.

Fertilizer applications account for over 75% of all ammonia produced, particularly in the Mid-West around U.S.I.'s ammonia plant at Tuscola, Ill. Consumption breakdown for other industries is:

Chemical Processes	7%
Explosives	5%
Synthetic Fibers	3%
Plastics & Resins	3%
Pulp & Paper	1.5%
Metallurgy	1%
Miscellaneous	3.5%

CONTINUED *Aerosol Valve*

escape. In pressure-filling through this type of valve, the liquid propellent being injected must somehow get past the seal of the inlet port and into the container.

This problem has been solved in valve design by adding two ports to the bottom part of the valve stem. A special attachment on the standard pressure-filling head depresses the valve to its limit. The two added ports then bypass the inlet port seal and provide a passage through the valve stem into the container for injection of propellant.

U.S.I. Names New V.P.

Paul J. LaMarche has recently been named Vice President of Production for U.S.I. Mr. LaMarche joined the company in 1949. Shortly thereafter, he became Manager of Sodium Sales. From 1951 to 1958, he was Manager of the company's plants at Ashtabula, Ohio. He became Director of Production in 1958.

Paul J. LaMarche

New Cold Soda Pulping Process in Pilot Stage

Uniform penetration of hardwood chips to yield a uniform pulp with good fiber length is the major innovation claimed for a new, continuous system of cold soda pulping, now reported in pilot operation.

The process is reported to have the usual advantage of cold soda pulping over other methods—a combination of high yields (85-95%), low power needs (12-25 hp. per ton), low chemical requirements, low capital outlay. However, this new process has been designed to achieve uniform penetration of chips by caustic, a problem with other cold soda processes.

Chips are fed into a tapered-throat screw press having an extra length of piping (a plug pipe) at its outlet. The screw forces the chips into this plug pipe, compressing them and forcing the air out of them. Chips are discharged into the caustic soda reactor where they expand into a sponge-like mass which becomes completely impregnated with caustic.

Cold soda processing has grown very rapidly since 1956. It is estimated that about 300,000 tons of pulp were made by the various cold soda processes in 1960. Commercial use of this new continuous process could increase this figure rapidly.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Dehydrated firefly tails now available for biochemical research. Can be processed into extract used to measure ATP (adenosine triphosphate). ATP, added to extract, produces light in proportion to quantity of ATP present. **No. 1670**

Pliable, easily cut refractory sheet for laboratory use is now on market. Reported to be excellent insulator when hardened in air or 350°F even. Suggested for hand grips, pump jackets, insulation for vessels, small ovens. **No. 1671**

New, highly-purified form of cellulose for food, drugs, cosmetics, now obtainable in research quantities. Said to give very firm, stable, opaque, creamy gels that are smooth, odorless, tasteless, non-caloric. In dry, free-flowing form, said to absorb fats and oils. **No. 1672**

New "Journal of Chemical Documentation" to be published twice a year, starting in 1961. Designed to ease dissemination of chemical information. Will cover such topics as information services, machine processing of information, resources of nations on specific subjects. **No. 1673**

Treating polyethylene film for printability is covered in new booklet now available. Discusses physical treatments by flame and the more adaptable electronic methods. **No. 1674**

High-purity isophthaloyl and terephthaloyl chlorides now produced in semi-commercial quantities. Suggested as raw materials for new synthetic fibers; intermediates for pigments, drugs, adhesives, rubber. **No. 1675**

Continuous addition of liquids to solids in precise amounts is reportedly achieved by new process recently developed. Thorough mixtures are provided at rates from 500 pounds to 150 tons per hour, it is claimed. **No. 1676**

New polycyclic alcohol is said to supply perfumer with all desirable characteristics of natural sandalwood oil—in a single aromatic chemical. Reported to have better residual properties than sandalwood itself. **No. 1677**

Use of radioactivity in developing and employing pharmaceutical agents is subject of 180-page book now being sold. In series of papers, experts discuss uses in analysis, product development and evaluation, tracing of drugs. **No. 1678**

Microporous cellulose acetate membrane is offered as improved medium for electrophoresis. Advantages claimed: speed, sharp separation, reproducibility, sample economy, chemical inertness, membrane strength, broad scope. **No. 1679**

PRODUCTS OF U.S.I.

Heavy Chemicals: Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

Organic Solvents and Intermediates: Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

Pharmaceutical Products: DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

Ethyl Alcohol: Pure and all denatured formulas; Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL PR

PETROTHENE® . . . Polyethylene Resins

MICROTHENE . . .Finely Divided Polyethylene Resin.

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Weed Controllers Going Dry

This year's Northeastern Weed Control Conference offered some new materials. But most attention centered on granular formulations and equipment suitable to apply them.

Literally as out-of-place as petunias in an onion patch, agricultural researchers last week quit the farms, brought the 15th annual meeting of the Northeastern Weed Control Conference into crowded New York's skyscraper Hotel New Yorker.

Almost 700 registered at the conference, heard about promising new compounds for weed control and about some new uses for some of the older ones. Granular formulations seemed to be of most interest to the conferees, as was the case at last year's meeting, and a ready audience was guaranteed anyone discussing formulations suitable for use in granular form, carriers for these formulations, or new equipment designed for applying them.

Fewer "new" products were discussed at this conference than at last year's. However, since "new" is an extremely relative word in the field of agricultural chemicals, a paucity of new items doesn't necessarily indicate a trend. There were some new ones, of course: among the companies showing experimental herbicides were Eli Lilly, Amchem Products, Velsicol Chemical, Rohm & Haas and Niagara Chemical Division of Food Machinery and Chemical Corp.

Lilly displayed new experimental herbicides, trifluralin and dipropalin, for seedling grass control in established turf. Trifluralin is the tentative generic name for N,N-di-n-propyl-2, 6- dinitro- 4- trifluoromethylaniline. Dipropalin is the tentative generic name of N, N-di-n-propyl-2,6-dinitro-4-methylaniline. Both are designed for pre-emergence control, are supplied in formulations of 2% concentration on a vermiculite carrier. Trifluralin, slightly more active than dipropalin, is soluble in water to 24 ppm.; the dipropalin, to 304 ppm. at 27 C. Lilly is recommending application rates of 4 to 8 lbs./acre.

Amchem Products is offering for experimental use in liquid and granular formulations a product it calls Amiben (3-amino-2,5-dichlorobenzoic acid). The liquid product is an amine formulation containing 2 lbs. active ingredient/gallon; for granular, a 24/48 mesh Attaclay, containing 10% active ingredient. The amine salt solution is a pre-emergence treatment for seeded crops such as carrots, lima beans and soybeans. The granular product is intended as a postemergence application for transplanted crops such as tomatoes, peppers and cabbage. Amchem says the herbicide offers good control of both annual grasses and broadleaf weeds.

Niagara's latest experimental herbicide, a material developed in the Netherlands, is called Casoron (2,6-dichlorobenzonitrile) and is formulated as a 50% wettable powder and as a 4% granular product. Application timing is unusual—it is to be applied after the crop emerges but before the weeds emerge. As such, it is best suited for transplanted crops such as tobacco, tomatoes, peppers, sweet potatoes and celery, and for such field-seeded crops as corn, peanuts, cotton, onions. It's also looked to as a pre-emergent treatment (3-4 lbs./acre) for such plants as peanuts, soybeans, snap beans and potatoes.

New Velsicol herbicides, which will be available for extensive field testing this year, are Banvel T (2-methoxy-3,5,6-trichlorobenzoic acid) and Banvel D (2-methoxy-3,6-dichlorobenzoic acid). The first is said to have shown good results as a foliar spray in controlling broadleaf weeds such as dog fennel and wild buckwheat; the latter is recommended for use against both annual broadleaf and grass weeds.

A postemergence herbicide, Stam F-34 (a 25% emulsifiable concentrate based on 3,4-dichloropropionanilide) is suggested by Rohm & Haas as particularly suitable for control of crabgrass, other annual grasses and chickweed in rice and turf. On rice the suggested application rate is 2-4 lbs. active ingredient/acre; for turf, about 3-4 lbs./acre.

Dow Chemical's Zytron, — 0-(2,4-dichlorophenyl) - 0 - methyl isopropylphosphoramidothioate—which gained the lion's share of attention last year as a promising new material for crabgrass control, got some hefty endorsements from researchers this year. Besides being effective as a pre-emergence treatment of crabgrass, the material shows promise for pre-emergent treating of carpet weed, chickweed, dooryard knotweed, pigweed, purslane and as a postemergence treatment of chickweed and henbit on turf areas.

When combined with dinitro for pre-emergent treating of soybeans, Zytron reportedly gives excellent weed control. It has also shown good results against annual weeds and grasses in ornamental nursery plantings and forest tree nursery seedling beds.

Sights on Surburbia: The researchers at the conference were given a target by Howard Campbell, a county agricultural agent in Nassau County, New York. He pointed out the need of materials suitable for home gardeners to use on new lawns, materials that will (1) kill weed seeds and residual grass plants to a depth of at least 6 in.; (2) disappear in about one week; (3) be effective at lower soil temperatures to allow early spring seedings; (4) be nontoxic to human beings and pets.

Campbell had several other suggestions, too: for established lawns, he advocated development of colored herbicides to give the home gardener some indication of the areas already covered. He also asked that herbicide marketers give home users measuring instructions not only in dry ounces and pounds but also in tablespoons, cupfuls, pints and quarts.

For many of those at the meeting, Campbell's comments on marketing aspects of weed control chemicals came as a worthwhile addition to what have usually been largely technical sessions. In any case, the conference stands in high regard as a top source of tip-offs on upcoming farm chemicals.

CW PHOTO—M. SCHREIBER

Humphreys' de Florez: Process switch recaptures foreign market.

Winning with Witch Hazel

Research—and contract research at that—is paying off in a big way for the Humphreys Medicine Co. (New York), 100-year-old producer of toiletries and proprietaries. With the help of Evans Research and Development Corp. (New York) the company has worked out a concentrated, easy-to-ship form of witch hazel that's enabled it to capture a dominant position in the overseas market for that item and to triple its foreign sales in five years.

Witch hazel has always been a costly product to ship: by weight it's 85% water, 14% alcohol and only 1% active ingredient. It's customarily made by chopping fresh witch hazel shrub (which grows in New England) into large kettles. Steam is passed through the kettles and the distillates are collected in a common receiver. Generally, ethyl alcohol is co-condensed with the steam so that the distillates have an alcohol content of about 14%. The distillates are then filtered, and the procedure has been to store the product in wooden barrels for shipment.

The bulkiness of the product and the heavy oak barrels usually used for shipping, plus a low retail price, have led to many attempts to concentrate witch hazel, either by distillation or extraction. These efforts resulted in a product that didn't smell much like witch hazel.

Evans Research's method (patented by Evans and assigned to Humphreys) involves separating the volatile components from the water vehicle by adsorption techniques. Specially activated carbon is agitated with fresh witch hazel until all the active ingredients are adsorbed. The dry carbon is sealed in glass containers, shipped to its destination as a concentrate, and then reconstituted by addition of grain alcohol and water.

Result: a product that compares favorably with commercially marketed witch hazel produced by the standard process.

This method could possibly be applied to concentration of other medicated waters such as wintergreen or peppermint. It also might be used to capture the essence of liquors—e.g., brandy and whisky.

The present drawback to commercial applications of the process in these product areas is cost. The process's expense would add unnecessarily to the retail prices of the items, especially in the U.S. market, where price-raising tariffs are not a factor.

Witch Hazel Trio: Only three companies in the U.S. manufacture witch hazel: United Witch Hazel Distillers, Inc. (New York), a subsidiary of Humphreys; American Distilling & Mfg. Co. (East Hampton, Conn.); and E. E. Dickinson Co. (Essex, Conn.). But over 500 retail brands are being sold by marketers, splitting up a $6-7-million/year market. Humphreys is a factor in both groups since it is a basic producer and a retail marketer.

Bad News Abroad: Humphreys had been selling in South America for about 40 years, had built up a thriving market there until after World War II. Then, many countries, troubled by dollar shortages, set up prohibitive tariffs on luxury items, including witch hazel.

(South America is reportedly a good market for witch hazel. The people there use witch hazel not only as an aftershave lotion and as an astringent ingredient in creams and other toiletries but also, it is thought, as a beverage.)

In two respects Humphreys found itself being gradually priced out of the South American market: duties became exorbitant, amounting in some countries to over $200 for a 50-gal. barrel. Price, duty-free: $25. Since 85% of the content is water and the containers were 100-lb. barrels, the company was paying heavily for freight on water and wood.

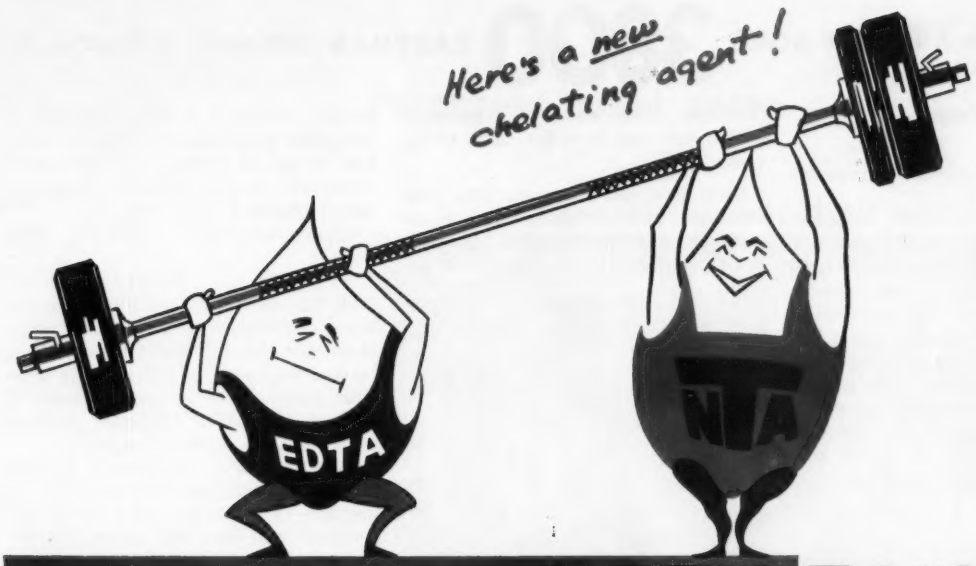
Mrs. Suzanne de Florez, president of Humphreys since '53, was determined to win back her company's main foreign market. Her problem—finding a way to concentrate the material and reconstitute it at its destination—was generally accepted in the industry as impossible and impractical to solve. Since Humphreys has no research department of its own, Mrs. de Florez turned to Evans Research for a solution.

Future Looks Good: Humphreys, although it has been using the process for some time, is only now revealing the success of its venture.

With its sales up "many times," the company has gained a considerable advantage over its competitors in South America and is thinking of extending its foreign operations to Europe.

Its concentrate now enters South American countries either duty-free or at a nominal tariff. Container costs may also be drastically cut in the near future, as Humphreys expects to switch soon to high-density polyethylene containers.

The result will be an even greater competitive advantage—and in this field, where the number of customers and their consumption is fairly fixed, such an advantage is definitely a strong one.



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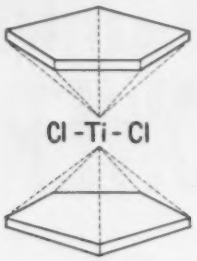
Eastman 4668
(Carboxymethyl)trimethylammonium Chloride Hydrazide
100 g. ..$3.85 500 g. ..$14.25

Generally known as Girard's reagent T. Reacts with carbonyl compounds from steroids and the like to give water-soluble derivatives. These can be identified by melting points. Do it that way and colleagues will start referring to you as sound scholar of the old school. To be considered bright young comer, study pp. 41-42, 113 of "Chromatography," Elsevier Publishing Co., New York, 1953. Tells how to do it by paper chromatography.

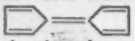
Aromatic titanium

Eastman 8057
Dicyclopentadienyltitanium Dichloride
5 g. ..$4.45 25 g. ..$18.25



Our first entry in the ferrocene class. That is to say, the first dicyclopentadienyl compound offered as an Eastman Organic Chemical. Have to watch language pretty carefully when mentioning compound reputed to be stereospecific catalyst for polyolefins. Wealth of empires hangs on such things. Nobody make a move, nobody drop or pick up a hint without first consulting his or her patent department.

Academics can afford to be carefreer. Follow knowledge where e'er it leads. Revel in ferrocenes as broadening whole concept of aromaticity in organic chemistry. Benzene, naphthalene, such old-fashioned aromatic nuclei essentially two-dimensional. Here aromaticity enters the third dimension. Whee!!!!

Considerations like zero dipole moment, non-polar nature, single C-H absorption band, x-ray diffraction pattern cinched pentagonal anti-prismatic "sandwich" structure. Real eye-opener. Offspring of casual liaison between two problems: preparation of organo-iron compounds and hunt for route to fulvalene,  .

Soon developed you could have other filling in sandwich besides iron. Funny thing. Our titanium ferrocene has bright, gleaming copper-bronze sheen to it, and

Would have been better to show this in color.

original iron ferrocene is also orange-colored. Apparently the color has more to do with the bread than with the filling.

Maybe that's not so funny.

Lot of literature around on ferrocene chemistry. Ran review article on it ourselves in house organ, *Organic Chemical Bulletin, 30,* No. 3, 1958. (Are ferrocenes truly organic? Is it wise to ask?) Didn't even have any ferrocene compounds to sell then. Published it merely because we had ferrocene expert on payroll and wanted to show him off. Still have few leftover copies of that issue. Free while they last.

Creatine dissembled

Eastman 7911
N-Amidinoalanine
10 g. ..$4.80 25 g. ..$10.50

Also known as dl-α-guanidinopropionic acid. Physiologists call it alacreatine. Physiologists want to know it better. Some physiologists, anyway. Particularly those interested in vitamin E. Nobody—absolutely nobody—is more interested in vitamin E than we are. Matter of business.

Deplete an animal of vitamin E and creatine shows up in urine. Creatine is $NH_2 - C(=NH) - N(CH_3) - CH_2 - C(=O)OH$. Normally creatine is used by combining with adenosine triphosphate to make phosphocreatine. After phosphocreatine yields up its energy, creatinine is left. Creatinine is anhydride of creatine. Vitamin E somehow mixed up in this. Creatine-to-creatinine ratio in urine is therefore good index of vitamin E status. OK.

Alacreatine is $NH_2 - C(=NH) - N(H) - CH(CH_3) - C(=O)OH$.

Note that difference from creatine is position of methyl group. Feed alacreatine to rats and what happens in 6 weeks? They become very weak, as in nutritional muscular dystrophy from lack of vitamin E (*Nature, 187,* 421). (Different etiology from human muscular dystrophy.)

Does alacreatine take place of genuine creatine in combining with ATP? Good question. Good answer could come from someone who buys our alacreatine for further studies. Might beat us in learning new fact about behavior of vitamin E. Would be consolation to know he at least used our alacreatine.

We make alacreatine by reacting thiourea with ethyl bromide to yield ethyl isothiourea hydrobromide, then add this with alkali to alanine. Product splits out with ethyl mercaptan. Ethyl mercaptan stench pretty well worn out as subject for levity.

Nature makes creatine by two-step method also. In kidney an amidine group from arginine transfers to glycine to make glycocyamine. In liver the glycocyamine takes on methyl group from methionine, becomes creatine. It's all done with enzymes. Nature neater, cheaper, makes more useful product.

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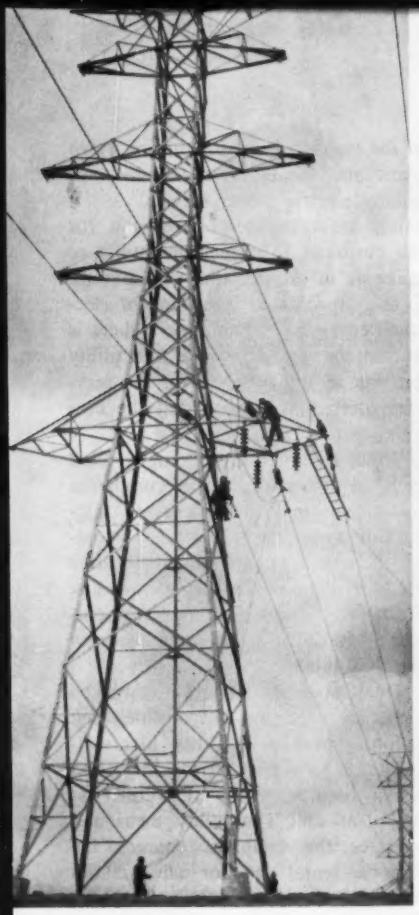
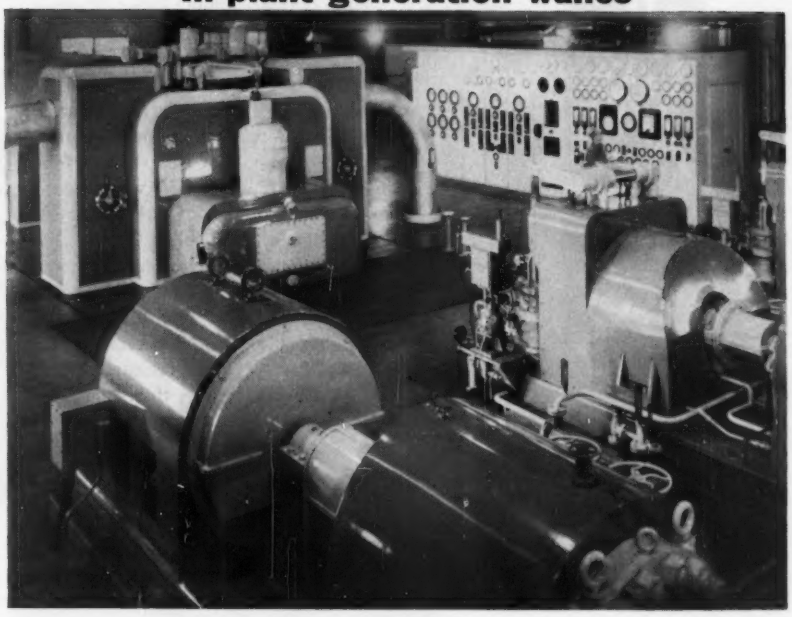


Purchased power gains

In-plant generation wanes



Power Switch Sparks Reliability Search

The old question of whether a plant should generate its own power or buy it stirs little controversy today—more and more companies have decided to buy it. But the trend is deceptive because it often hides the concentrated study now under way on the real — and increasingly difficult — problem: how to improve the reliability of plant power supply. And the chemical process industries' stake in the solution is high.

With the growth of continuous processing, greater emphasis on electronic control instrumentation and computer control of processes, many plants can no longer afford to have power interruptions of even short duration. In some cases, it takes hours or even days to get a plant running properly after a forced shutdown. And data collected by Bill Dickinson of Esso Research and Engineering and Carl Olson of Westinghouse Electric* from more than 40 plants (refineries, chemical, metallurgical and pharmaceutical) shows just what the chances of a power interruption are.

Each year, they say, chemical process plants are faced with an 81% probability of a utility power supply failure. Each failure can be expected to cause the supply source to be out for about one hour.

About half the failures can be attributed to weather (e.g., lightning, ice, rain, wind). But the rest can be expected from electrical and mechanical failure of the equipment, fire and activities such as maintenance and construction (e.g., damage of cables by cranes and trenching equipment), human error (e.g., incorrect switching).

The Price Isn't Right: There is little argument on the basic point that plants generating their own power have better service continuity. For one thing, there is less exposure of power lines. Result was that during the '30s, plants that required extreme electrical reliability often installed their own generating equipment. But today's economics have helped change the picture, turned companies away from building their own power plants.

The economics are plain: a company can figure on getting about 4 to 6% return on a power plant investment, which doesn't compare favorably with the better than 10% return that's usually required of an investment in a chemical process. Even an exceptionally large power station (for a process plant) for generating 40,000-50,000 kw. probably couldn't return as much as 8%.

Some engineers argue that the low return rate shouldn't be regarded as a clear reason to purchase power. Money invested in generating facilities is safe—almost guaranteed—while the investment return on a chemical process is a gamble. But the argument seems to be losing rather than gaining headway.

Short of in-plant generation, the simplest solution to improving electrical reliability is to have two lines into the plant. With this, the CPI user must make certain that the utility has stand-by and auxiliaries needed for an emergency. But most companies

* Reported at the American Institute of Electrical Engineers Electrical Conference of the Petroleum Industry in Oklahoma City last fall and to be analyzed in greater detail at future AIEE meetings.

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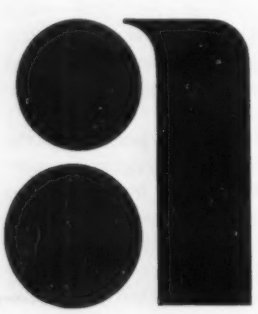
PROPERTY DATA

CHEMICAL FORMULA . . . CH_3Cl
MOLECULAR WEIGHT . . . 50.491
SPECIFIC GRAVITY
Liquid—23.7°C/4° . . . 1.00
20°C/4° 92
Gas 0°C, 1 atmos . . . 1.74
BOILING POINT °C, 760 mm . . . —23.76
°F, 760 mm . . . —10.76
REFRACTIVE INDEX, n_D 20°/D
Liquid—23.7°C . . . 1.3712
Gas 25°C . . . 1.000703
SOLUBILITY (in cc.) of Methyl Chloride Gas in 100 cc. of solvent (20°C, 760 mm)
Water . . . 303
Benzene . . . 4723
Carbon Tetrachloride . . . 3756
Glacial Acetic Acid . . . 3679
Ethanol . . . 3740



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agree that there is no cheap way to get really reliable two-line power. "You have to pay through the nose for a stand-by power contract," says an electrical engineer at one chemical company.

What Is Interruption? Stand-by power can improve reliability, but it may lead to a false sense of security. "History is full of cases where the customer has found out afterwards that the utility's definition of interruption and his own were two different things—and neither was necessarily wrong," says Maurice Gilbert of Du Pont's Engineering Dept.

For example, most high-voltage transmission lines have automatic reclosing equipment. When a line fault occurs, the circuit breakers open, clearing the fault, then reclose. Often, only a few cycles (less than one second) of power are lost and the utility does not consider that a power interruption.

But the chemical plant may think differently. A synchronous motor driving a piece of process equipment can take some small interruptions without stopping. But should it wind up out of phase with the alternating current when restored, this out-of-phase condition can result in shutdown.

Even a voltage dip can cause problems. A dip to 70% of normal for one cycle might not cause a motor starter or contactor to drop out. But a dip to 70% for 60 cycles, or to 30% for one cycle, would probably cause starter drop-out.

And while the action of most starters and contactors is delayed long enough to cause no trouble during some dips, many interlocking functions are now performed by static switching devices that have no such delays, says Gilbert. All-electronic pressure, temperature and flow transmitters and receivers are susceptible to voltage and frequency variations which will affect calibration in some cases, cause process shutdown in others. And data reduction and logging equipment, automatic calculators for process control, all are made up almost entirely of static switching and memory systems.

Three-Way Effort: Gilbert, speaking at last fall's National Power Conference, summarized the path to improved power reliability as a cooperative effort of users, utility companies and equipment manufacturers. "One of the major reasons for turning down plant site locations is the lack of quality electric power service. . . . It would be completely unrealistic for the customer to expect the utility to make an investment that would result in the unprofitable furnishing of electrical energy. . . . Some place there is a common ground where the utility can put in the facilities for the service required at a price that the customer can afford to pay," he says.

When it comes to building a plant in a new location, some companies make the point that for every kilowatt of power needed by the customer, there will be an additional three or four kilowatts in less-demanding power for homes (i.e., those of employees brought in to staff the new chemical plant).

Dual Fees: Du Pont has worked out some solutions with utilities that call for installation of two high-voltage lines with dual transformers and related equipment by the utility at the plant site. The utility owns and operates the facilities, charges Du Pont a rental fee for all facilities over and above what the utility considers normal supply costs for the size of load involved.

At one location with a completely electronic control system, Du Pont can supply emergency power from its own turbo generator for critical instruments. An induction motor, with a capacitor for excitation, acts as induction generator to furnish the voltage and power during transfer from one source to the other.

Studying the Problem: Gulf States Utilities used an analog computer donated by a group of Southwest utilities for a complete study of proposed changes in its Baton Rouge power station setup last year. The station had been knocked out during a severe thunderstorm last April, caused complete shutdown at Humble and Ethyl. Gulf States normally puts its system under improvement study on the computer (now at Texas A & M) about four times each year.

But all utility and in-plant power distribution systems don't require improved reliability. One refiner, studying electrical equipment reliability data such as that collected by Esso Research's Dickinson and Westinghouse's Olson, is finding that some of its plant distribution systems don't need the reliability that was once thought

why chemical companies are taking a closer look at DELHI-TAYLOR

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to be required. "Until we set about collecting reliable data on equipment failures we were just guessing about how reliable our systems had to be. And guessing costs us money because we built in unneeded extra protection," says an electrical engineer at the refinery.

Pushing Developments: Some chemical companies point out that the equipment needed to improve the reliability of their distribution systems isn't always commercially available. But Tom Bloodworth, senior systems engineer at Allis-Chalmers, feels that the situation is changing rapidly.

Vacuum switches are an example. Now used only for higher voltages, Allis-Chalmers engineers say there's no reason why they can't be used for lower voltages, too. Rectifiers for converting alternating current into direct have undergone complete changes within the last 10 years. Before talk of the advantages in using newly developed germanium rectifiers instead of mechanical rectifiers had subsided, the germanium rectifier was made obsolete by the silicon rectifier. And further improvements are in store using newer controlled-silicon rectifiers, says Bloodworth.

Cap Murdock, Allis-Chalmers industrial systems supervisory engineer, adds that some new developments have resulted from pushes by the chemical industry. For example, improved insulations developed by chemical companies are now being used for better motor performance. "Now, the metal in the motor is the limiting factor rather than insulation," he says.

Murdock also points to the trend in higher-voltage distribution systems (*CW, Mar. 8, '58, p. 48*). Many plants are already shifting from 6,900-volt to 13,800-volt distribution systems which save on power losses in the line. "In a few years many will be going to 23,000-volt systems. A few have already started. One refinery is already at 34,500 volts. It is just a matter of education," says Murdock.

Now, many systems are housed indoors. "Eventually, they will all be outdoors. Or, if some protection is necessary, suitable low-cost housings will be developed," Murdock adds.

Less in the Plant: Of course, distribution systems go to high voltages only as plants grow, spread out over greater land areas. Longer power distribution lines mean larger power loss-

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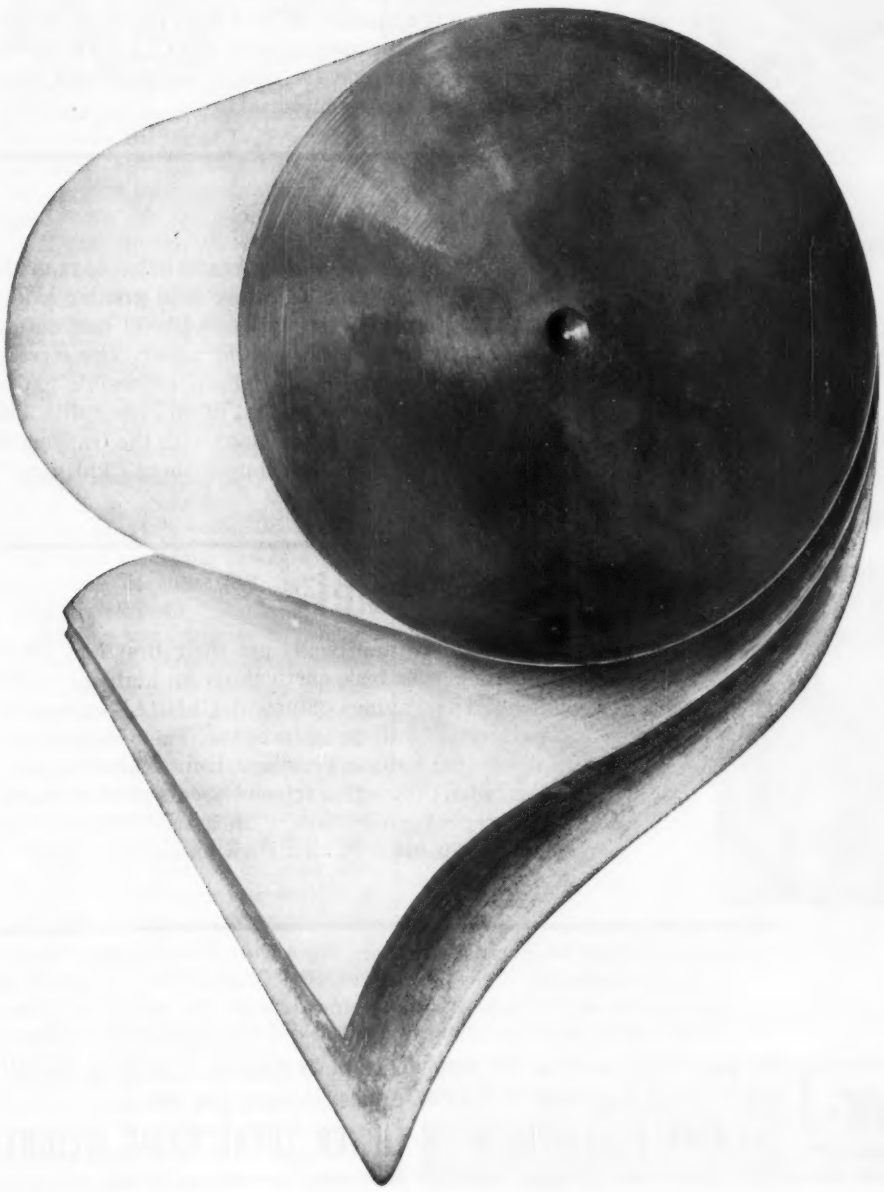
Scarcely an industry exists that cannot benefit from Nopco's skilled hand in Chemistry. For the full range of Nopco products, see Chemical Materials Catalog, pages 212-213.



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Multiwall and baler bags made of new CLUPAK extensible paper withstand the strain and impact that cause conventional bags to rip, split or tear. This increased toughness allows multiwall and baler bag users to increase package strength yet decrease the number of plys with resulting economies. The next time you order, say CLUPAK before you say paper and see how it out-performs your present packaging material.

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3 On The Filling Line!

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Prior to CLUPAK extensible paper, there were no controlled standards of toughness in the paper industry. Clupak, Inc., is proud to have established these standards and permits the use of its trademark only on paper which meets these rigid toughness requirements.

EXTENSIBLE CLUPAK® PAPER

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*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N.Y. 36, N.Y.

es—particularly at lower voltages.

The trend toward higher voltages suggests a growth to plant sizes that might make large (higher-return-on-investment) plant power stations economically attractive. The reverse is actually true, says Bill Wilson, senior engineer for power generation and large process drives at General Electric.

As Wilson explains it, the investment in large high-pressure boilers for the generator station turbines would be the cost stumbling block. Even though larger boilers might be needed to handle the process steam load, it would be cheaper to use less costly, low-pressure models and forego electrical power turbines.

Today many plants are able to operate with inexpensive package boilers for their process steam requirements. But Lyman Darling of Du Pont's Engineering Dept. has sounded a warning: package boilers are all oil- or gas-fired (built for use with pulverized coal, they would be too large for shipment by railroad as a package, so, with gas rates climbing and import restrictions making residual oil more scarce, coal could become the most economical fuel within a few years (*CW Energy Report, May 14, '60*).

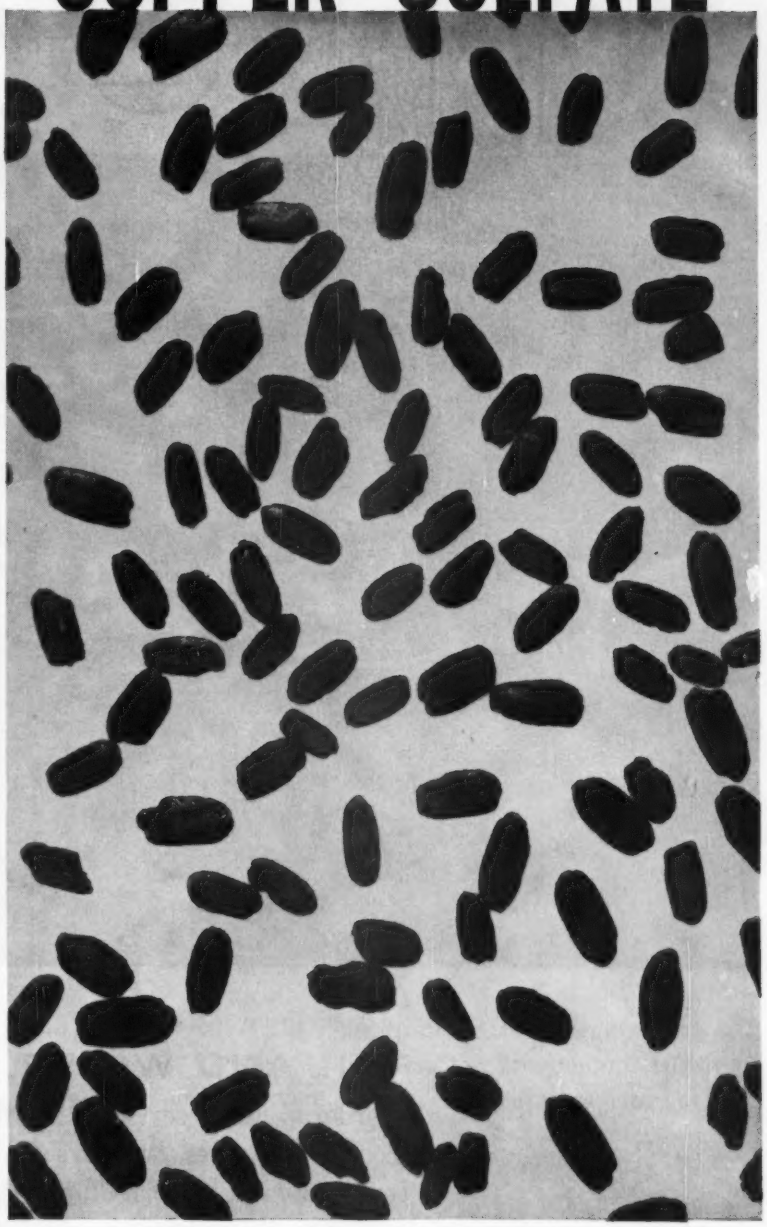
The solution might be to use an inexpensive package boiler for present steam requirements, be prepared to scrap it in about five years for a field-erected boiler that would take pulverized coal. (The cost of a package boiler is about half that of a field-erected one.)

Westinghouse suggests a solution to future low-pressure steam generation: nuclear power. Among the limiting factors: fossil fuel costs in the area would have to be above 55-60¢/million Btu. for a nuclear plant to have economic advantages.

One electrical equipment maker suggests the future use of fuel cells, points to one chemical processor with by-product hydrogen that could supply 90% of plant power requirements if fed to fuel cells. The catch: it would take at least five years to develop the fuel cells.

With no reversal of the current trend toward purchasing electrical power, generating only steam requirements within the plant, the increased reliability of electrical power systems seems certain to be a cooperative problem for a long time to come.

COPPER SULFATE



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- **Storage capacity totals 31,000 tons for molten sulphur and 1,000,000 tons for solid sulphur. Loading capacity for molten sulphur ranges up to 3,000 tons/hour, tanker and barge simultaneously; for solid sulphur the loading capacity is 1,200 tons/hour into ship or barge.**

This development at Beaumont is but another step in the broadening delivery service program now being carried out by TGS. Regional distribution centers, handling molten sulphur, are already in operation at Cincinnati, St. Louis and Tampa. Coinciding with the full operation of our main terminal at Beaumont will be the opening early in 1961 of two coastal terminals at Carteret, New Jersey, (26,000 tons molten sulphur storage) and Norfolk, Virginia (20,000 tons). Other terminals are in the planning stage.

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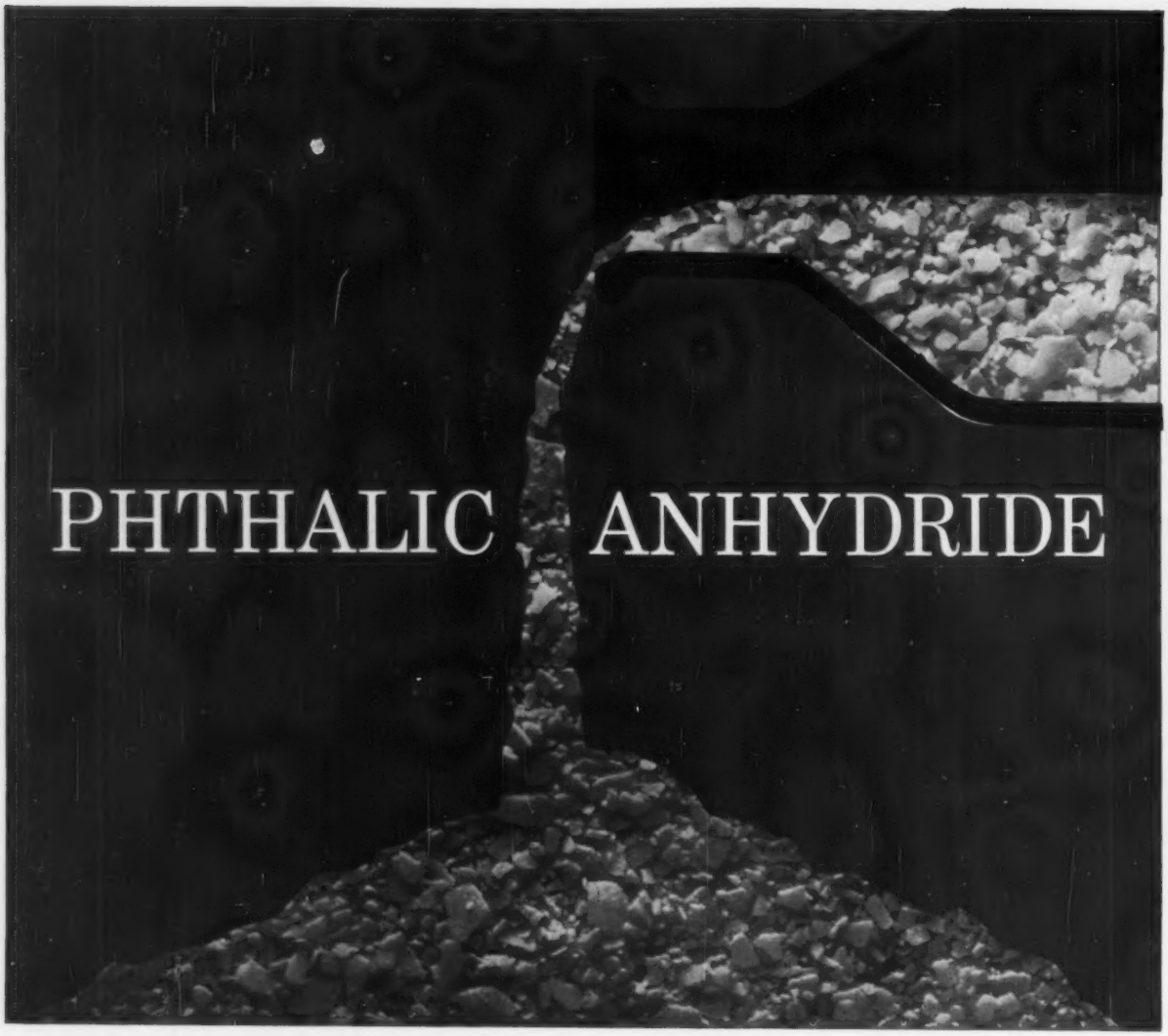

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Drawing Bead on Bulk Packaging Problems

Bulk shipping has given the CPI lower-cost shipping, faster deliveries. But many problems still plague packaging men. Now a new trade group bids to help solve some of them.

This week packaging and distribution men in the chemical process industries are getting their first look at a newly formed trade group designed to assist them in solving a pressing problem: the development of faster, cheaper means of bulk shipping.

The new Bulk Packaging and Containerization Institute is holding its kickoff meeting in conjunction with an all-day containerization conference in New York City. But despite the group's optimism, there are indications that it may take some time—and plenty of work—to gain widespread support for it in the process industries.

That's partly because the new organization has not yet solicited support widely among CPI product distribution men. More important, it's because few of those who have examined the group's proposals have developed any enthusiasm for them.

Goal of the organizers: to set up an organization to coordinate and speed the development of more efficient bulk-shipping methods for all industry. It's easy to see that such efforts would likely have great significance for shippers in the chemical process industries, where huge quantities of raw materials and finished products are shipped in bulk and where handling and distribution costs often represent upwards of 25% of the finished cost.

How It Works: The new group, which plans to incorporate as a nonprofit organization, has set out to serve two different but interrelated fields of product distribution: bulk packaging and containerization.

Bulk packaging, as the institute defines it, includes all types of containers used for shipping liquids, semiliquids and solids with net weights usually exceeding 300 lbs. Among them: steel and fiber drums, heavy-duty corrugated, wooden or wire-bound boxes, rubber cord fabric containers (*CW, Oct. 29, '60, p. 57*) and many other kinds of large bulk containers, both one-way and returnable.

Containerization is defined as the use of large freight boxes to group pieces of packaged freight or sometimes to handle bulk materials. The group proposes to include such related matters as dunnage—material used to pack freight securely—and palletizing and unitizing operations. Individual pallet studies will be excluded, however.

The institute sees its role as that of an information clearinghouse and proponent of effective specifications for containers. It aims to serve two distinct interests: shippers who use these means of product distribution, and manufacturers of the packaging and transportation equipment involved.

The main projects that have been proposed for '61 by the institute:

- Prepare data on all kinds of bulk containers now used, including capacities, construction, tare weight, closures and specifications for member companies.
- Evaluate experience and examine potential economies of shipping dry materials in bulk in carload quantities—such as rail-hopper cars. The group's Potential Cost Reduction Committee has begun operating under Frank Green, a packaging consultant.
- Push for specifications in cargo containers that would eliminate overpackaging, thus help reduce packaging costs.

Growing Pains: First steps to organize the institute were taken in late '60 by a group of packaging and transportation men headed by Glenn Mather, former managing director of the now-defunct Fiber Drum Assn., and Fred Muller, Jr., transportation and materials-handling specialist with Arthur D. Little, Inc. So far, the institute appears to have convinced very few CPI shipping men of its potential value to them and their companies.

But at the same time the CPI is exploring the many opportunities for faster, cheaper product movement via bulk and containerized shipments. Last year CPI firms made great strides in adapting bulk methods to their distribution requirements. Monsanto Chemical Co., for example, launched what it calls the first "piggyback" rail shipment of a chemical tank trailer when it shipped a load of *ortho*-dichlorobenzene across the U.S. in half the time usually required for either tank truck or rail shipment. Monsanto backed up its development of this and other bulk-shipping methods by distributing two studies on bulk shipping—one on various bulk container systems, the other on use of hopper-car shipments of plastics—to its customers. And the Assn. of American Railroads recently reported that trailer-on-flatcar (piggyback) traffic in '60 jumped nearly one-third over '59's volume, while total rail traffic declined slightly.

The rather cool CPI reception to the new group's proposals stems more from specific criticisms than from lack of interest in bulk shipping.

For one thing, many CPI packaging and shipping men figure they are already supporting more packaging trade groups than they care to, and the addition of another might further confuse the situation. Moreover, they are not sure that the group's split purposes (serving both shippers and equipment makers in both bulk packaging and containerization) will allow it to do an effective job.

Another criticism: the proposed activities are too general. Many CPI firms have developed specialized bulk-shipping methods, now feel that further progress in this field will come more from such specific company innovations than from broad activities such as those proposed by the new group.

And, of course, some have withheld support of the institute because of the costs involved. (Dues range from $180 for firms with annual sales under $250,000 to $1,000 for

billion-dollar sales companies.)

What's Ahead: It's not yet clear just how much CPI support the institute can muster, but it seems apparent that whatever it gets will be hard-won.

Before launching the institute, the organizers had promoted a periodic newsletter, designed to keep shippers abreast of developments in the bulk-shipping field. But this project failed to gain necessary support, and there are some who feel that the new institute might come to the same end.

Allied Sales Shifts

Last week two divisions of Allied Chemical Corp.—Barrett (road-building materials) and National Aniline (chemicals and dyes)—disclosed expansion of their sales organizations. Both moves are designed to decentralize field operations, permitting a more intensive coverage of markets.

In the Barrett shift three new sales districts were created in Binghamton, N.Y., Cincinnati and Detroit, bringing to seven Barrett's total number of paving-materials sales districts in the U.S. In addition, Barrett has realigned all of its selling areas east of the Mississippi River except those in New England.

The change, notes Sales Director B.C. Cowart, will allow greater coverage of markets for road tar, bituminous concrete, asphalt, process sand and gravel, at the same time offers increased opportunities to train field sales managers.

In the National Aniline move, the former Isocyanate Sales group has been doubled in size—from four to eight men—and renamed the Urethane Chemicals Sales group. The new name indicates the broadened scope of the group's sales efforts. This year it will begin marketing polyethers—in addition to isocyanates—for use in polyurethane foams. The polyethers will be manufactured by Allied's Solvay Process Division at the latter's Baton Rouge, La., plant—due onstream later this year.

Besides broadening its product line, the Urethane Chemical Sales group is decentralizing. Until recently, most Isocyanate Sales staffers made their calls from headquarters in New York. Now sales representatives will establish bases of operation in specific field territories.

Ads Survive Squeeze

How have '61 advertising budgets survived the profit pinch? A recent survey by the Assn. of Industrial Advertisers suggests most of them have actually been slightly fattened. Among chemical process companies, however, there are fewer signs of budget increases.

The AIA survey points out that emphasis will be more on specific products sold to industry and proportionately less on institutional or "image" advertising. Almost half the ad managers queried report plans to cut corporate advertising. On the other hand, some 20% plan greater stress on institutional promotion, although over one-third see no shift from their '60 balance.

Business and trade papers will bear the brunt of ad program shakeups, the report continues. Although these media were mentioned most frequently (43 times) as outlets for fresh spending, budget-cutters place them first on the list to get the ax.

CPI Puzzle: A CHEMICAL WEEK spot-check turned up equally mixed plans for this year. One firm reports definite plans for boosting its institutional advertising. Others, however, see an over-all decline in this area, citing the cost squeeze on profits behind the familiar "hard sell." "Corporate image advertising becomes a luxury many just can't afford," said one observer.

CPI advertising budgets, in any event, won't be seriously affected this year. The only shift indicated so far is renewed emphasis on the individual product and its identification with the manufacturer.

DATA DIGEST

• **Asbestos:** Brochure outlines uses and characteristics of various grades of asbestos. Background information describes mining, milling, quality control, research, packaging and shipping. Carey-Canadian Mines, Ltd. (P.O. Box 95, Cincinnati 15, O.).

• **Polypropylene Film:** Pamphlet cites chemical and physical properties of new polypropylene packaging film. AviSun Corp. (1345 Chestnut St., Philadelphia 7).

• **Carbonyl Iron Powders:** New 28-page booklet describes physical, chemical and electromagnetic characteristics of 11 types of carbonyl iron powders used in electronic cores. Antara Chemicals Division, General Aniline & Film Corp. (Dept. 300, 435 Hudson St., New York 14).

• **Vat Dyeing:** Booklet outlines properties and uses of more than 70 vat dyes. Also included: dye property tables and index with both tradenames and generic names. General Dyestuffs Division of General Aniline & Film.

• **Rubber Products:** New condensed catalog describes company's line of rubber products for industry, transmission and conveyor belts, hose, flexible pipe, plus a summary of molded and extruded products. Manhattan Rubber Division, Raybestos-Manhattan, Inc. (Passaic, N.J.)

• **Marine Chemicals:** Brochure outlines uses and effectiveness of degreasers, combustion catalysts, emulsifiers and detergents for marine applications. Dunham Chemical Co. (79 Wall St., New York 5).

• **Ceramics:** Bulletin (No. 121) describes new series of heat- and wear-resistant ceramics, includes application and physical data. Duramic Products, Inc. (426 Commercial Ave., Palisades Park, N.J.).

• **Phosphorus Assay:** New assay report describes availability of phosphorus from different nutrient compounds. Smith-Douglass Co., Inc. (Norfolk, Va.).

• **Lithium Compounds:** Folder describes lithium compounds available either commercially or on an experimental basis. Foote Mineral Co. (18 West Chelten Ave., Philadelphia 44).

• **Fiber Guide:** Pocket-size booklet presents current information on textile fibers, fabrics, blends, dyes and finishes. Dow Corning Corp. (Midland, Mich.).

• **Crystal Materials:** Brochure describes crystal materials and production facilities available for solid-state electronics research. Solid State Materials Corp. (7 Erie Dr., Industrial Park, East Natick, Mass.).

• **Citric Acid Cleaning:** Data sheet (No. 557) lists procedures and advantages of derusting with ammoniated citric acid solutions. Chas. Pfizer & Co., Inc. (630 Flushing Ave., Brooklyn 6, N.Y.).

• **Aluminum Enamels:** New booklet cites properties and advantages of aluminum with porcelain enamel finishes. Lead Industries Assn. (292 Madison Ave., New York 17).

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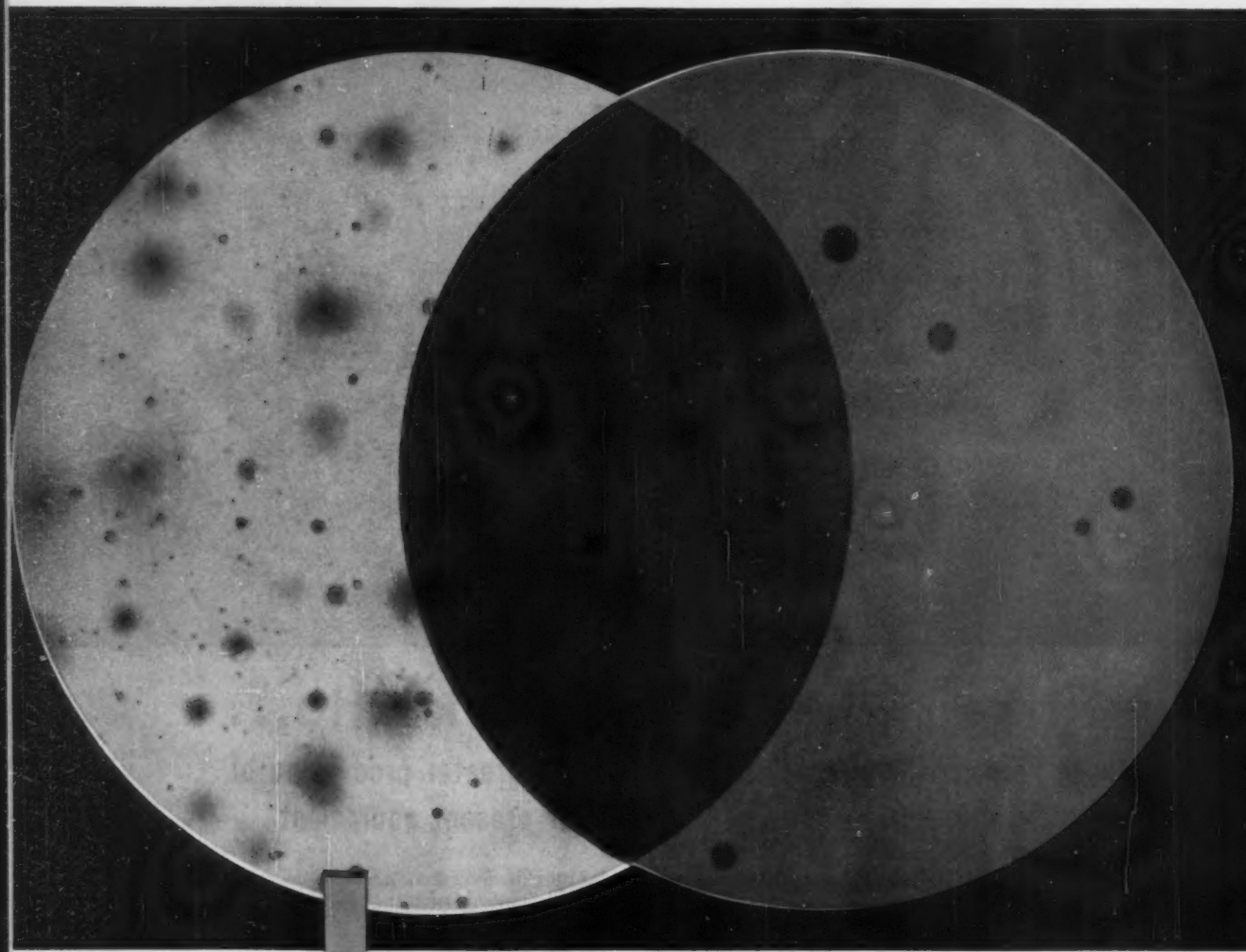
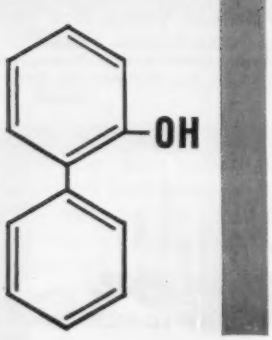
EMULSIFICATION

EMULSION ADDITIVES are frequently necessary to preserve the desired emulsion characteristics. The leading emulsion problems controlled with additives are decomposition resulting from bacterial or fungal growth, and instability or undesirable color effects due to trace metal ion contamination.





MOST EMULSIONS contain materials which support the growth of bacteria or fungi. These microorganisms subsist on the emulsion components and produce metabolic waste products, many of them acidic. These waste products react with the emulsion components and decompose important constituents such as emulsifiers, dispersants, coupling agents, soaps, etc., thereby reducing the stability of the emulsion. Since many emulsion formulations are slightly alkaline, the waste acids can also affect the pH which frequently is critical to the stability of the emulsion. Effective control of both bacteria and fungi in emulsions is given by the Dowicide® products, a group of phenolic compounds the simplest of which is o-phenylphenol, Dowicide 1. Broad-spectrum bactericides, the Dowicide products are available with either water or oil solubility.

BACTERICIDE

PRESERVATIVE CONTROLS EMULSION BREAKDOWN AND ODOR PROBLEMS IN SOLUBLE OIL EMULSIONS

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The concentration of Dowicide A that is generally necessary to preserve the emulsion is between 0.10 and 0.15% based on the total weight of the emulsion (water and oil). A practical method of attaining this concentration is to add 1 pound of Dowicide A to 100 gallons of emulsion (0.12%). This concentration will normally prevent emulsion breakdown and odor formation over an extended period even when machines are not operating. Bacterial protection is needed throughout the system. Badly contaminated systems should be cleaned and disinfected before treatment with Dowicide is started.

Latex paints, cosmetics, adhesives, and many other emulsion systems subject to organism attack are protected by treatment with Dowicide products. Full information on specific applications are available from Dow.

ADVANTAGES OF ADDING DOWICIDE TO AN EMULSION

- **Emulsions protected from bacterial decomposition**
- **Bacterial population held to a minimum**
- **Useable life of emulsion is extended**
- **pH of emulsion is not reduced**
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- **Discoloration due to organisms prevented**
- **Slime and sludge formation reduced**
- **Reduced corrosion due to bacteria acid in metal contact operations**
- **Reduced dermatitis caused by bacteria**

CHELATING AGENT

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In latex stabilization, Versene will prevent decomposition, precipitation, sludge formation, and putrefaction. Trace metal ions are complexed and their destructive influences are eliminated.

STABILIZATION OF AQUEOUS RESIN EMULSIONS. Traces of metal-ion contamination in aqueous resin emulsions frequently cause premature settling and instability. Also, in many systems, particularly those based on phenolic resins, traces of iron impart high, undesirable color levels through the formation of iron-phenolate-type complexes. Controlling these metal ions with chelating agents results in emulsions with improved shelf life and greater stability. The use of 0.5-1.0% of Versenex® 80 is usually sufficient to control color.

The Dow Chemical Company, Midland, Michigan
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☐ For information on Dowicide products, ☐ "Keys to Chelation" Booklet

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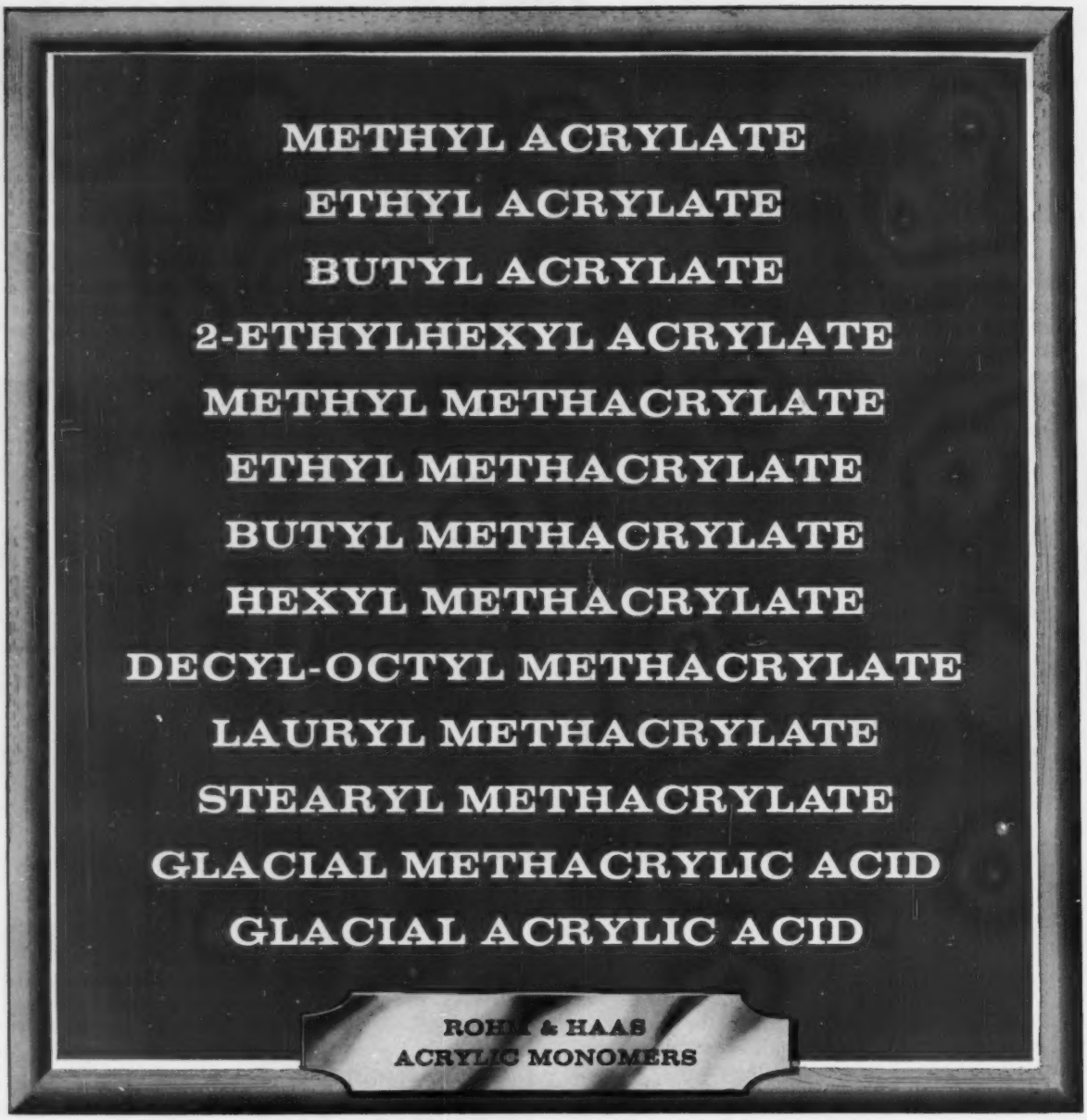

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Late-afternoon sun silhouettes partly completed laboratory at research park overlooking the Pacific.

Research: Welcome Addition to the Scenery

The partly finished laboratory shown above is the $4.5-million first portion of a new research center being built by Nortronics Division of Northrop Corp. The site, on a 1,200-ft.-high peninsula jutting into the Pacific Ocean, is part of Palos Verdes Research Park (Los Angeles County)—a good example of the desirable locations opened up through the recent and growing practice of communities' zoning land specifically to accommodate research facilities.

Other new parks now looking for research customers rather than manufacturers include the Kentucky Spindletop Research Park (outside Lexington); Sunnyvale, Calif., Science Center; bigger and better-known Sterling Forest (Orange County, New York) and Research Triangle Park (Durham and Wake counties in North Carolina).

The same confidence in the municipal advantages of welcoming R&D projects is making local officials (e.g., at Skokie, Ill.) willing to rezone choice land for companies—provided they confine their programs to research activities.

Competitive Push: The increasing competition for research personnel is one reason why companies are seeking zoning "dispensations"—it's a recruiting asset to have a lab in especially desirable surroundings. In attracting personnel, scenery comes into consideration as well as do nearness to educational facilities and availability of suitable housing.

A company finds it relatively easy to sell conservative local governments and landowners on the glamor, prestige and cleanliness of research, whereas a manufacturing operation often meets resistance because it must involve at least shipments and a labor force. R&D zones, however, are relatively uncommon classifications—companies must often introduce the idea to local governments.

California Development: Great Lakes Carbon Corp., owner of the Palos Verdes park, first had to sell the

concept of R&D zoning before it could promote its area. This was done after it had disposed of other land that it owned on the peninsula; by '57 it was down to a 410-acre parcel in the midst of a growing residential and recreational area. The firm's vice-president and general manager, De-Otis Marlett, had the idea of developing the land as a research and development park. A wholly owned subsidiary, Great Lakes Properties, Inc., was created to hold and develop the 410 acres; Stanford Research Institute conducted a $40,000 feasibility study; and architect Victor Gruen was hired to develop a master plan for the proposed research park.

With the results of the SRI study and the master plan, Great Lakes Properties approached the Los Angeles County planning commission to request a zoning change. After a series of conferences and public hearings, a zoning amendment was made in Jan. '58, providing for a new classification called "Scientific Research and Development (Zone SR-D)." Great Lakes then requested that its land be classified "Zone SR-D" and, after further public hearings, the request was granted.

In addition to restrictions on noise, odor, smoke, vibration, heat and glare, the amendment states, "All resultant products initiated, developed or completed in Zone SR-D shall be restricted to prototypes."

Selling Well: As research parks go, Palos Verdes is selling rather well. Nortronics will eventually occupy 100 acres. Great Lakes Carbon plans a facility for its Mining and Mineral Products Division in two or three years. And a real estate operator will soon start construction of several small lab buildings on a 5-acre plot; he plans to lease space to firms with limited requirements. In addition to these firm commitments, two companies are seriously considering 20-acre sites, and five others are interested in 3- to 5-acre locations. Cost of land is $30,000/acre for lots of less than 20 acres, $25,000/acre for 20 acres or more.

Kentucky Newcomer: Just getting under way is a new park on Spindletop Farm, situated in the horse-breeding bluegrass lands of Fayette County, Kentucky, near Lexington. Owned by Kentucky Research Foundation, an offshoot of the University of Kentucky, the 1,066-acre farm includes two areas that have been set aside for research: 75 acres for a foundation-owned nonprofit institute and 350 acres for a park.

Initially, complaints about the proposed development were voiced by neighboring horse breeders. However, rezoning by the Lexington and Fayette County Planning and Zoning Commission limits the use of the land to research, and the promise of a campus-like atmosphere has melted opposition to the plan.

No Goods for Sale: Similar zoning was adopted about a year ago by the two North Carolina counties in which 4,600-acre Research Triangle Park is situated. Previously, the land, a portion of the sparsely settled area bounded by Raleigh, Durham and Chapel Hill, was unzoned.

Key paragraphs of the ordinance: "No manufacturing or processing enterprises shall be conducted except as such activities are adjuncts of research activities conducted within the Research Triangle Park. There shall be no goods or products manufactured primarily for sale."

Biggest plum landed by this park is the Chemstrand Research Center —a 170,000-sq.ft. structure that opened Sept. 1.

A 200-acre nonprofit research institute is also part of the park. The first institute building, containing 20,000 sq.ft., opened recently, and the Camille Dreyfus polymer research laboratory is under construction, as is a 10,000-sq.ft. building for incoming companies to use until their own facilities are completed. A regional forestry lab operated by the U.S. Dept. of Agriculture will also be built on institute grounds, starting in April.

Zoning for Protection: A zoning change made in Sunnyvale, Calif., was requested for a different reason. A 130-acre parcel bought in May '59 by International Science Foundation was previously zoned for heavy industry. A change to permit only research (and some technologically centered light industry) was made to protect the foundation's plans to establish the Sunnyvale Science Center, a park devoted mainly to research.

First lab built will be the home of the advanced research arm of General Electric Co.'s Computer Division. Groundbreaking on GE's 6-acre site is expected in the spring, with plant completion due by the end of the year. The University of California is currently raising money to construct an extension school on 3½ acres.

Big Project: Probably the most ambitious project is 17,000-acre Sterling Forest, a carefully controlled planned complex of residential, industrial and scenic areas. Although Union Carbide Nuclear Co. has conducted research there for over three years, the area is still unzoned.

Samuel Walker, president of Sterling Forest Corp., tells CHEMICAL WEEK that his firm didn't wait for local opposition to develop. Rather it took the initiative and met with citizens' groups in 16 surrounding communities to explain nuclear energy as well as plans for the entire development. Reaction has been so favorable that Walker is working closely with the three municipalities in which the park is situated—Tuxedo, Warwick and Monroe—to develop a comprehensive zoning ordinance.

Newest development at Sterling Forest is the purchase of 1,000 acres by New York University. The land, tagged "University Valley," will be used for basic and applied research and for educational activities.

First new structure to be completed in the park was Sterling Forest's own International Research Building, part of which is being used by graphic arts research firm Impcomation until its own lab is completed.

Because of the vast area involved and the sparse population in the neighboring area, some types of light manufacturing will be allowed.

Zoning for "research only" is, however, the trend in many parts of the country. Wilton, Conn., did just that when Escambia Chemical wanted to build a research center there in '56. Monsanto was confronted with a strictly enforced academic research (no pilot plants) regulation when it moved into Creve Coeur, Mo., in '58. And Skokie, Ill., which is the home of several research labs in light-industry zones, is now considering a zoning change that would allow research and testing labs to be built in a new zone for office buildings, hotels and various types of nonindustrial institutions.

Whether a company wants to enter a research park or prefers to try for rezoning, it's finding the job easier if it shuns even light manufacturing.

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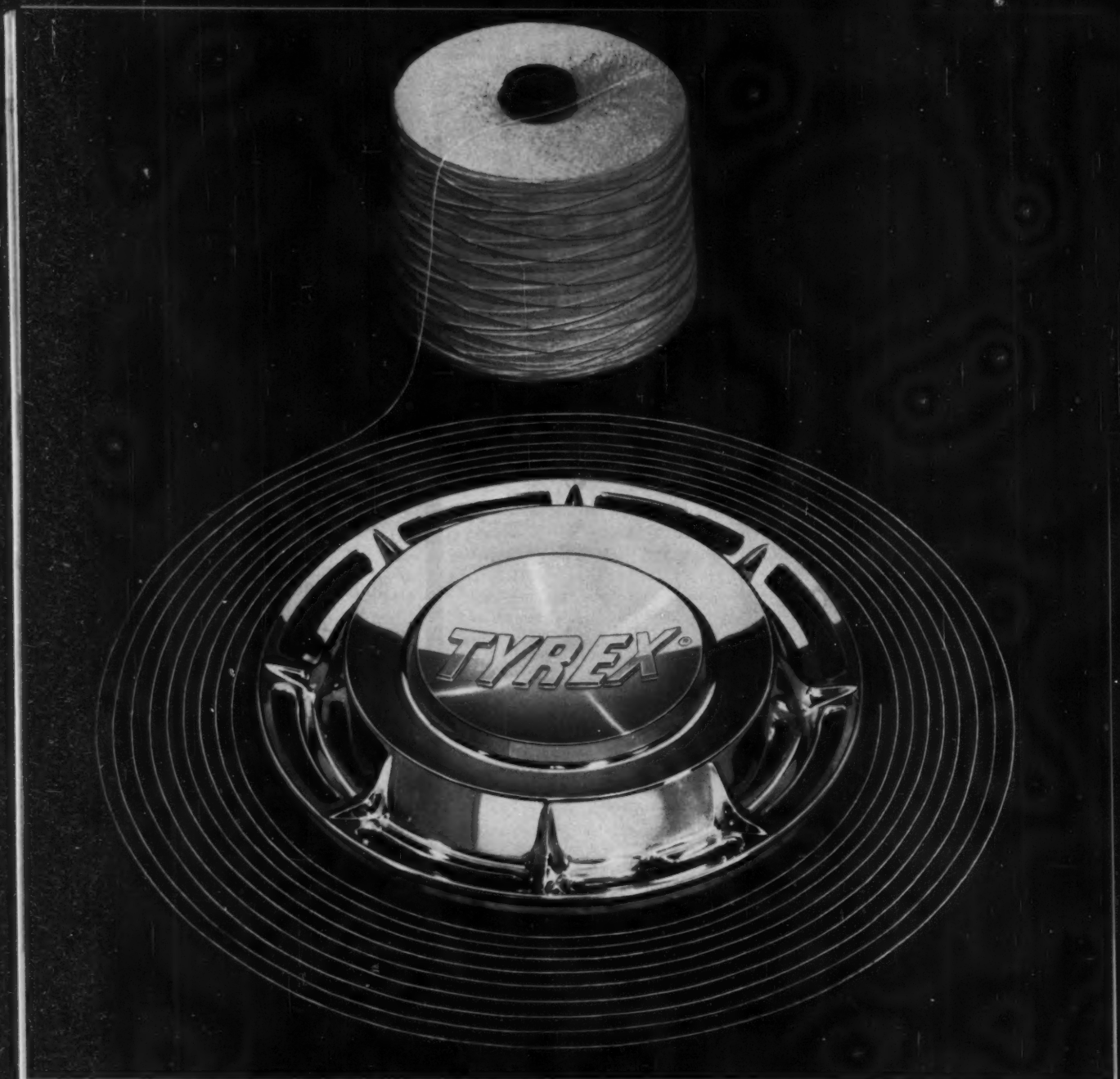

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Technology
Newsletter

CHEMICAL WEEK
January 21, 1961

Tantalum's already excellent properties can be improved for a wider range of uses as a corrosion- and high-temperature-resistant material in chemical plant construction. Troublesome metal cracking and failure caused by hydrogen embrittlement can be prevented by a small spot of platinum that is attached to the tantalum mechanically (e.g., as a rivet) or by sputtering and spot welding to form a galvanic couple.

Union Carbide Metals Co. researchers Claude R. Bishop and Milton Stern, in experiments at Niagara Falls, N. Y., over the past three years, have found that the platinum spot protects an area of tantalum 10,000 times larger than the spot from concentrated hydrochloric acid at 374 F for more than 1,000 hours. Unprotected tantalum is embrittled in a few hours.

The corrosion rate of tantalum is not increased by the contact with platinum—in some cases is decreased. And the corrosion rate of platinum, which is known to be relatively high in concentrated hydrochloric acid at high temperatures, is reduced to a negligible value by contact with the tantalum.

UCM researchers are saving the details of their findings for a paper to be presented in March at a National Assn. of Corrosion Engineers meeting at Buffalo, N. Y.

But it's known that embrittlement of tantalum is caused by the absorption of hydrogen by the metal lattice, which expands, becomes stressed in such a way as to cause embrittlement. In chemical plant service, embrittlement may be caused by hydrogen ions in aggressive reducing-acid environments and by cathodic charging of the metal. For example, stray cathodic currents could be produced by a hole in a glass-lined vessel that has a tantalum plug sealing a previously made hole. (Tantalum plugs are commonly used to repair glass linings in vessels.)

•

A new twist in controlling slime in sulfite paper-mill waste liquors has been placed in operation at Crown Zellerbach's Camas, Wash., mill. Key: starve the bacteria (*sphaerotilus*), which thrive on wood sugars in the sulfite liquors.

Based on CZ laboratory work simulating basins and river channels, a $750,000 waste disposal system has been installed on an island in the Columbia River. Main part of the system is a 48-acre diked basin. Waste liquors are piped into this basin and held for at least five days before being discharged into the Columbia. This is enough time to weaken the *sphaerotilus* to the point where they can never produce slime on boat anchor lines, fishermen's nets, etc.

•

Benzyl alcohol is the key to two new dyeing processes developed by Geigy in Zurich. Called Irga-Solvent processes, they're used in conventional wool dyeing and in dyeing nylon piece goods by the jig method.

Selected acid dyes are used in each case. For wool, about 9.07% (by volume) benzyl alcohol helps shorten dyeing time at 90 C, saving labor, steam, and water costs; and results in almost 100% exhaustion of dye on fiber. But several dyeings must be carried out in the same liquor to offset solvent costs—a practice more likely to find favor abroad than in the U.S. (U.S. dyers lean to fast schedules, are less concerned about complete utilization of dyes and carriers). Scoured, heat-set nylon is dyed at 60 C using 4% benzyl alcohol (by volume), acetic acid, and an anionic auxiliary (optional). Good fastness, evenness of dyeing, and high production rates are claimed.

•

Vaccines to combat the common cold are in sight, according to Christopher Andrewes, deputy director of Britain's National Institute of Medical Research. "We think we are on to something," says Andrewes, who believes the first vaccines will be single shots effective against one type of virus, followed by "cocktail" vaccines to give protection against a number of major types of colds. Another line of research that looks promising is the use of the body-produced protein interferon, discovered by the institute's Alec Isaac. Interferon helps overcome infection.

•

Two late developments in computer process control (*see also p. 73*): The first use of closed-loop computer control for a catalytic cracking unit will start in early '61 at Gulf Oil Corp.'s Philadelphia refinery. The 60,000-bbls./day unit will be fully controlled by a Thompson-Ramo-Wooldridge RW-300. Besides raising operating efficiency up to 95% by improving control of reactor temperature and recycle ratio, the installation should provide know-how to benefit all existing and future units.

A catalytic acrylonitrile process using ammonia, air and propylene as raw materials in the guinea pig for a research program to develop computer control systems. Conducted jointly by International Business Machines (Yorktown Heights, N.Y.) and Du Pont (Gibbstown, N.J.), the research is aimed at developing dynamic control techniques. This contrasts with process control today, which involves averaging a number of static or equilibrium situations, rather than continuously adjusting the process.

•

Chlorinated polypropylene—first in the U.S. is now offered by Hercules Powder. The new resin, called Parlon P, has physical properties resembling Hercules' regular chlorinated rubber product (Parlon), but is water-white. Its clear films are said to have proved stable under dry-heat tests at about 260 F and have shown better stability than Parlon under exposure to ultraviolet arcs. Selling at 58¢/lb., Parlon P is 2¢/lb. less than Parlon. It's already finding commercial use in coatings and printing inks, adhesives. In coatings, it contributes hardness, abrasion resistance and resistance to alkalis, acids, salt spray, etc. In inks, it contributes color stability. Although Parlon P is currently being produced in the same production unit used for making Parlon, its manufacturing process is described as different.

Better Paints Start Here

Dow Corning Resin Number and Type	Percent Solids: Solvent Type	Viscosity, Gardner-Holdt	Viscosity, Centipoises	Color, Gardner	Pounds Per Gal.	Flexibility*	Hardness*	Craze Life, Hr. At 250 C	Thermoplasticity*	Leafing*	Service Temp., °F, Colored	Service Temp., °F, Aluminum	Weatherability*	Gloss Retention*	Application
804 Silicone	60 Toluene	A-3 to A	20-40	2	8.8	3	8	100	8	9	400	600	1	10	Blending Resin
805 Silicone	50 Xylene	C-F	80-150	2	8.4	10	3	8000	3	7	550	1000	10	3	Vehicle for Aluminum Paints
806A Silicone	50 Toluene	D-H	100-200	1	8.5	5	8	2500	7	3	500	1000	5	10	Vehicle for High Gloss Enamels
808 Silicone	50 Xylene	F-J	150-250	2	8.4	9	6	5000	4	6	550	1000	10	10	Vehicle for High Gloss Enamels
840 Silicone	60 Toluene	A-1 to A-3	15-25	2	8.8	5	7	900	7	9	450	800	5	9	Blending Resin
R-60031 Silicone-alkyd Copolymer	50 Cellosolve Acetate, Toluene	D-L	100-300	4	8.8	10	10	500	10	10	450	600	10	10	Vehicle for Appliance, Exterior Enamels (Baking Type)
XR-60032† Silicone-alkyd Copolymer	60 Mineral Spirits	V-Y	750-1500	6	7.8	10	9	100	9	3	400	800	10	9	Vehicle for Maintenance Paints (Air Dry)

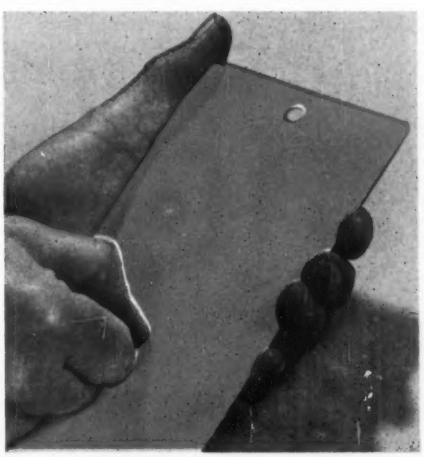
* Relative Comparison: 1 = very poor; 10 = excellent. † Available in trial samples only.

For more durable coatings formulate with silicone resins

Start your formulation with these Dow Corning resins and copolymers and you're sure to produce finishes that last longer, cut maintenance costs, assure user satisfaction. You can even pre-determine the degree of heat stability, weather resistance, gloss retention, or other properties needed to meet the requirements of specific applications.

In maintenance coatings where heat may be a problem, Dow Corning 805 and 806A Resins provide lasting resistance to 1000 F when blended in aluminum formulations. Such paints are excellent for use on stacks, mufflers, boilers, jet engines, exhaust manifolds and other hot spots. Where painted areas must maintain color at temperatures up to 550 F, your choice should be 808 Resin. You'll find coatings made with 808 Resin resist fading and chalking . . . lengthen the time between repaintings. And if you're interested in air-drying silicone organic copolymers, note that Dow Corning also offers silicone intermediates . . . you can enjoy the economies of cooking your own vehicles.

Product finishes, too, are better when you start with silicones. In this field, Dow Corning R-60031 silicone-alkyd copolymer helps in formulating decorative finishes that hold color and adhere well at surface temperatures as high as 450 F. Finishes made with this copolymer are ideal for space heaters, clothes driers, stoves, other hot appliances. When temperatures rise to 550 F, Dow Corning 804 and 808 Resins are recommended.



You make better finishes when you start with the Dow Corning silicone resins and copolymers listed above. For more specific information, write Dept. 2213.

Your best source for information about silicone resins, intermediates, and paint additives is the Dow Corning office nearest you.

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CHEMICALS OUTLOOK

January, 1961

This news bulletin about Wyandotte Chemicals services, products, and their applications, is published to help keep you posted. Perhaps you will want to route these and subsequent facts to interested members of your organization. Additional information and trial quantities of Wyandotte products are available upon request . . . may we serve you?

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Propylene glycol is also on the FDA "extension list" of indirect food additives, a list of substances which, on the basis of present findings, do not involve undue risk to the public health. The specified uses of propylene glycol on this "extension list" are: as a plasticizer in adhesives in food packaging materials, as a plasticizer in rubber and rubber products used in food handling, and as an ingredient in liners of containers used in food packaging, all consistent with good food manufacturing practice.

Among its other important applications are: plasticizer and humectant in the manufacture of cellophane; preservative and humectant in cigarettes; ingredient in cosmetics and pharmaceutical products; industrial coolant for food processing equipment.

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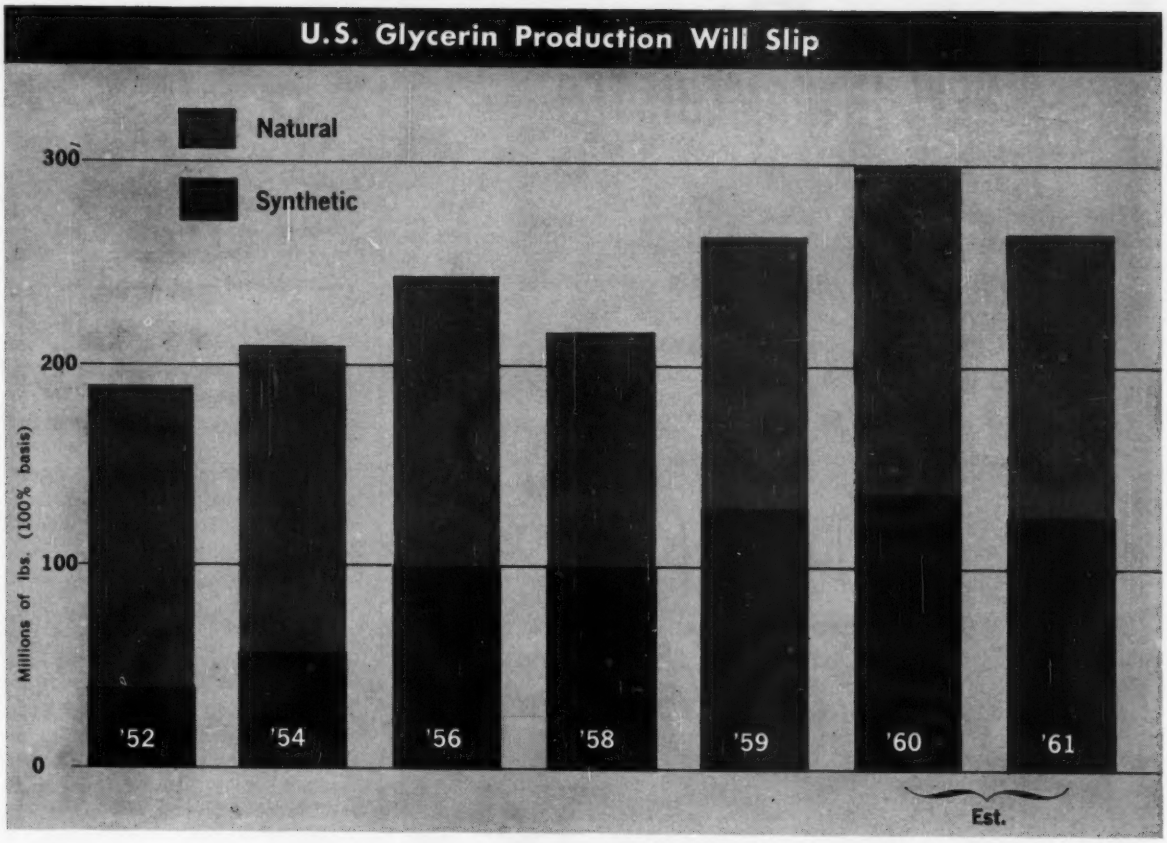

World Buildup Brakes U.S. Glycerin Output

Glycerin producers had a lot to cheer about during the past two years, as demand for their product skyrocketed. But the recent buildup of glycerin stocks in the U.S. and abroad, plus the lagging domestic economy, seem sure to slow U.S. output during '61. Further affecting the glycerin outlook is the likely startup of new production facilities.

Shell's new, 35-million-lbs./year glycerin facilities at Norco, La., for example, are nearing completion. The company is still having some difficulties with its acrolein unit, but it reportedly has already produced some glycerin. The glycerin unit appears to be no problem, but the acrolein operation is impeding full-scale production.

And Olin Mathieson, another company whose entry into competition has long a point of speculation, is now making definite moves toward joining the synthetic producers. In December, OM broke ground for a unit at Doe Run, Ky. It originally reported intentions of getting into the glycerin business in mid-'59 *(CW, Aug. 15, '59, p. 75)*, expected to be in operation the early part of this year. It never made that target date, but estimates now are that the company will be in a position to produce by early '62. Size of the plant has not been disclosed, but early estimates were for 30-35 million lbs./year. The firm probably will use at least 10-12 million lbs./year captively, and sell the rest.

Meanwhile, other companies, both here and abroad, are reported to be actively studying the feasibility of getting into synthetic glycerin production, and one U.S. polyols producer may make a clear-cut move in that direction during the next few months.

In Japan, Nippon Yushi Kogyko KK, is reported to be building that country's first synthetic unit. Initial capacity: 6 million lbs./year, readily expandable to 20 million lbs./year.

Another Record Year: Although the next year or two may hold some complications for glycerin makers, '60 was a solidly good year for them. Complete year-end figures won't be available for some time, but E. Scott Pattison, manager of Glycerine Producers' Assn., says that both production and demand, called "disappearance,"* was at record levels.

Preliminary estimates, he adds, put '60 production at about 300 million lbs., a rise of 12% over the 267.7 million lbs. turned out in '59. Consumption was about 280 million lbs., an increase of 11.6% over '59's 259.8 million lbs. Comparison of glycerin

* Disappearance is calculated by adding together the stocks at the beginning of the month and production for the month, plus imports, then subtracting exports and stocks at the end of the month.

6
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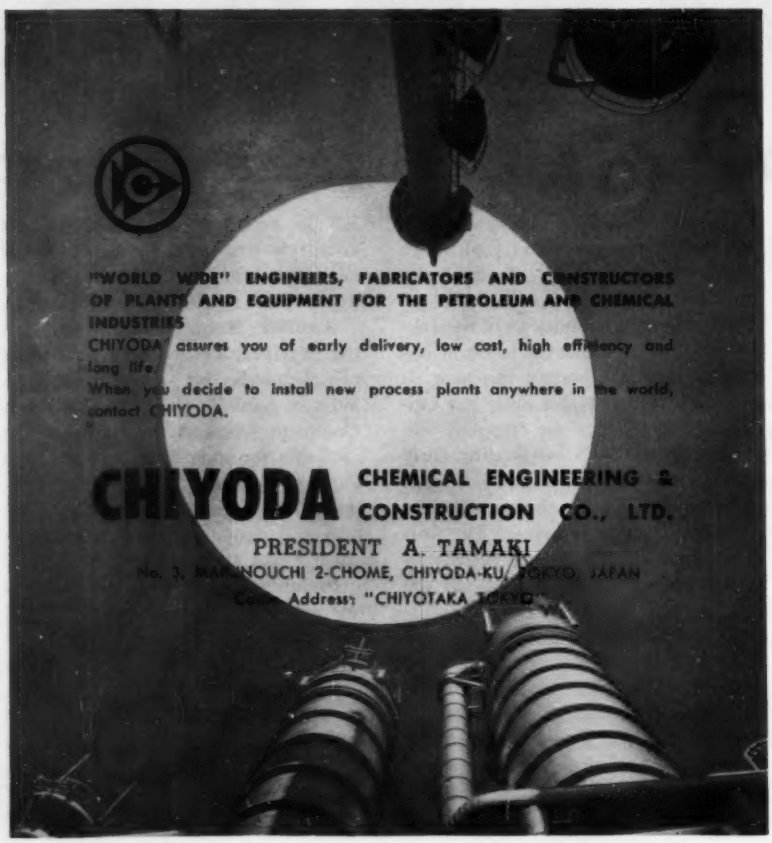
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World Synthetic Glycerin Capacity
(*million pounds*)

Shell Chemical	Houston, Tex.	110
Dow Chemical	Freeport, Tex.	70
Olin Mathieson	Doe Run, Ky.	30-35*
Royal Dutch/ Shell	Pernis, Holland	44
Solvay et Cie	Tavaux, France	12

* Company reports that ground has been broken for the new unit; startup: early '62.

statistics with those before '59 are not exactly accurate because of the recent change in the method of reporting stocks. Revised statistics for '59 and '60 contain only producers' factory and warehouse stocks, whereas previous figures included stocks held by consumers. However, they do give an indication of the rapid surge in demand during the past two years.

Before the changeover, the industry set a consumption record of 243 million lbs. in '57. Following a drop to 236 million lbs. in recession-year '58, total consumption started a rapid climb, increased 20.6 million lbs. in '59 and 30 million lbs. more in '60. Outlook for '61: business to remain at least near present levels, perhaps a slight drop.

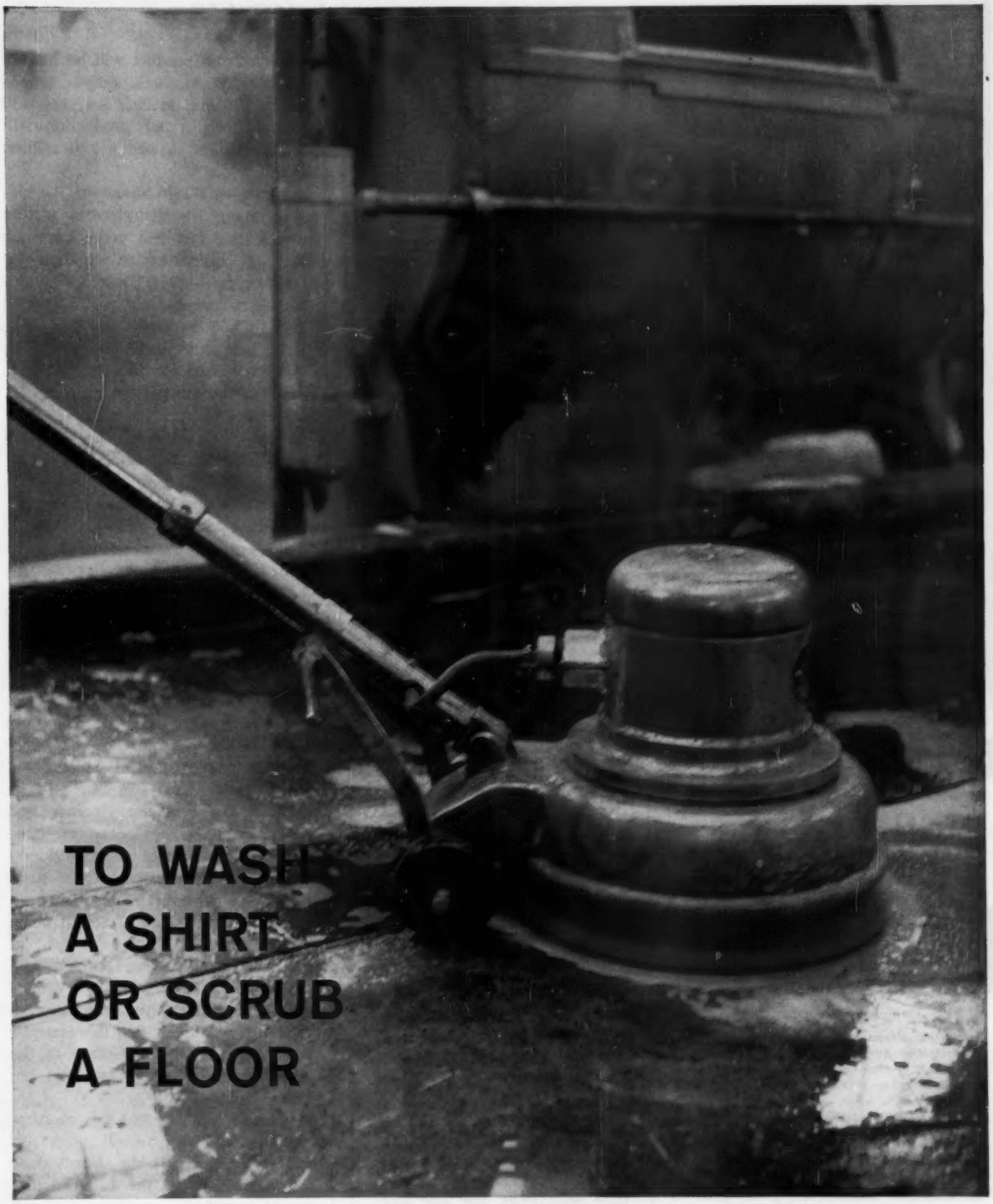
Production Slowdown: On the production end, however, the situation will be quite different, due to three major factors: (1) producers' stocks have risen to high levels; (2) imports during the past few months have been moving upward, will probably continue at higher levels through '61; (3) U.S. exports will continue the downward pattern of recent months.

Today's situation is a reversal of that of '59. Then, heavy demands for glycerin, both in the U.S. and abroad, cut sharply into stocks, dropped them to 30.7 million lbs. in September of that year.

Since then, however, producers' inventories have moved steadily upward. By the end of Oct. '60 (latest month for which figures are available) stocks had climbed 20.4 million lbs., to 51.1 million lbs.

With the higher inventories (which tie up capital), the upward trend of the past few years will have to be reversed.

This will reduce production rates during the next year, and makers of



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the synthetic product will be hardest hit. In '59 synthetic output totaled about 120 million lbs.; last year, 130 million lbs. In '61 production will likely decline to about 120 million lbs.

Changing World Situation: The biggest change in the glycerin picture during the past two years has been the U.S. import-export situation. At one time, imports were a major source of supply—e.g., in '57, when 26.9 million lbs. came into this country. Then, during '59 and early '60, growing demands in Europe kept much of this material away from U.S. shores.

Now the situation has changed again. Between July and Oct. '60 imports totaled 7.5 million lbs., 50% higher than the total amount brought in during the first half of the year. Recent price cuts on domestic material *(CW Market Newsletter, Jan. 7)* will probably stem the tide, although imports—at least in '61—may rise to 15-20 million lbs.

Behind the import situation is the rapid buildup of supplies in Europe. One of the contributing factors: relatively high production of soap and fatty alcohol, concomitant ample supplies of natural glycerin. In addition, Royal Dutch/Shell has increased its capacity for synthetic glycerin, and Solvay brought the second synthetic unit on the Continent onstream during the year. Also contributing was some forward buying by many European consumers who were afraid of being caught short.

Taken together, these factors add up to oversupply that will allow sizable quantities of the polyol to flow to the U.S.; it is also likely that this material will arrive to take advantage of the 27¢/lb. price that U.S. supplies are now getting.

It's quite obvious that this oversupply outside the U.S. will affect this country's exports. It has already done so; in fact during the July-Oct. '60 period, monthly export figures moved downward.

While the net result of all these forces doubtless will mean a reduction of U.S. output during '61, how long this problem will last is still hard to say. But with world demands for glycerin growing, it's not unlikely that the entire situation could once again reverse itself within another year or two.

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Chemical Week's BUYERS' GUIDE ISSUE—1961

How Union-Camp's 5-Star Multiwall Plan increased a pallet payload by 400 lbs...without increasing its size!

A leading supplier of high density resins* had been packing his product in 50-lb. sewn-bottom multiwalls. This gave him an efficient, 40-bag (2,000 lb.) pallet load.

When he added a *low density* resin to his line, however, he found his existing bag wouldn't accommodate 50 lbs. of the new resin due to its increased volume. A slightly larger, sewn-bottom multiwall was tried, but this reduced the pallet payload to 32 bags (1,600 lbs.). Net "loss": 400 lbs. Net result: more handling . . . more trips to the warehouse . . . higher cost.

Heightening the pallets to 10 tiers instead of 8, offered no solution—they wouldn't pass through the existing archways. To say nothing of the problem of loading trucks and trailer cars.

New bag does the trick

At this point, the 5-Star Packaging Efficiency Plan went to work. Union-Camp multiwall specialists experimented with several different bag sizes and styles. Their solution—a multiwall with a *pasted* bottom and side gussets, a *rectangular*-shaped base—and 20 per cent more capacity!

With the new design, 50 lbs. of the low density resin can now be packed in each bag. Most importantly, the pasted bottom bags can be palletized five to a tier, eight tiers to a skid for a total payload of 2,000 lbs.—the same as the high density resins.

Warehouse space saved

The pasted-bottom bag offered several outstanding advantages. It permitted better use of warehouse space. It increased the yield per warehouseman to *1,000,000 lbs. a month.* And it initiated the development of a similar design for the company's high density resins, which could increase the present pallet payload to 2,500 lbs.

Space-saving secret is in bottom of bag. New design (left) with rectangular-shaped base has 20 per cent more capacity than sewn-bottom bag (right).

Works for you five ways

Apart from bag construction and materials handling, Union-Camp's 5-Star Plan covers bag design, packaging machinery and specifications control. An improvement in any one of these areas conceivably could result in substantial savings for you. In any case, it costs nothing to find out. See your local Union-Camp man for complete details.

2,000 pallet load of new, low density resin bags fits easily through existing doors.

FREE 16-PAGE BOOKLET

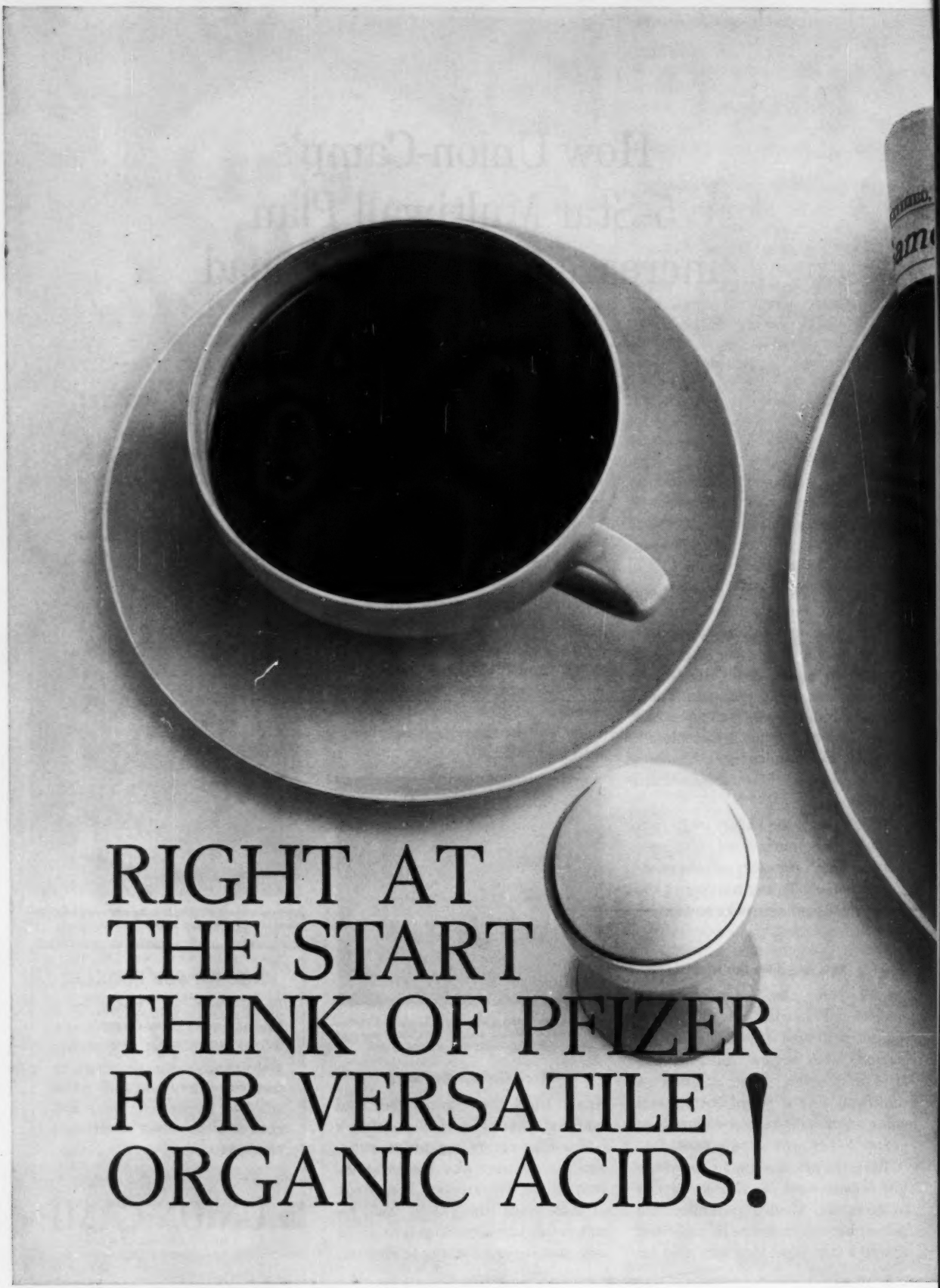
Write Dept. M-3 today for a free copy of Union-Camp's new 5-Star Plan booklet. It describes many case histories showing how packers like yourself have achieved greater efficiency and economy in their multiwall operation.

UNION-CAMP

MULTIWALL BAGS

Union Bag-Camp Paper Corporation · 233 Broadway N.Y. 7, N.Y.

* NAME ON REQUEST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THE START
THINK OF PFIZER
FOR VERSATILE
ORGANIC ACIDS!

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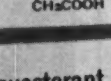
FUMARIC ACID—Low toxicity—a prime raw material in the manufacture of alkyd resins, and rosin adducts—useful to the paint and plastics industries.

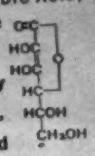
Citric Acid—*Non-toxic—excellent sequesterant—one of the most versatile of industrial organic acids—efficient cleaner for ferrous and non-ferrous metals—successfully used in power plant cleaning and radioactive decontamination programs.*

Citroflex® esters are gaining a reputation as efficient, non-toxic plasticizers.



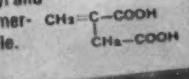
ERYTHORBIC ACID
(formerly ISOASCORBIC ACID)

Non-toxic—effective industrial antioxidant—widely used in brewing industry to protect beer against "off-taste" and "haze" caused by oxidation.

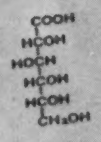


ITACONIC ACID—

Low-toxicity—reactive monomer—Carboxyl groups can add adhesion, solubility and stability to copolymers. Other Itaconic Monomers (Dimethyl and Dibutyl) commercially available.



GLUCONIC ACID—Non-toxic—outstanding sequesterant in caustic solutions—low corrosion rate—extremely useful in the formulation of metal and glass cleaning compounds for aluminum etching, rust removal, paint stripping, glass mold cleaning and bottle washing. Also used in electroplating and other industrial sequesterant applications.



OXALIC ACID

Strong organic acid—noted for its ability to solubilize iron oxide—salts important in blueprinting and gold coloring of aluminum—widely used in metal cleaners and polishers.

TARTARIC ACID

Non-toxic—excellent sequesterant—salts widely used in metal cleaning and plating, textile printing, and blueprinting, plus a host of related industries.

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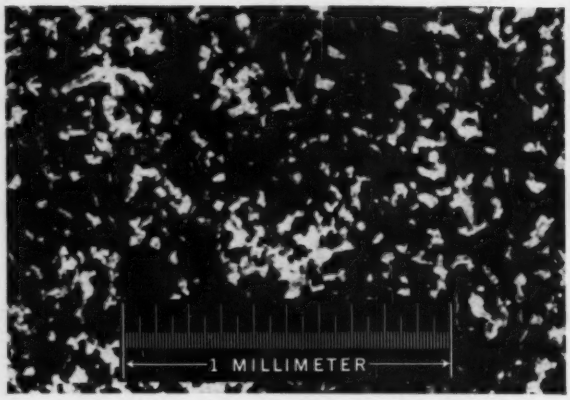
Sodium Bicarbonate U.S.P. Powdered No. 1—For general purpose use in chemical processing, dyestuffs, adhesives, starches, textiles and industrial applications.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

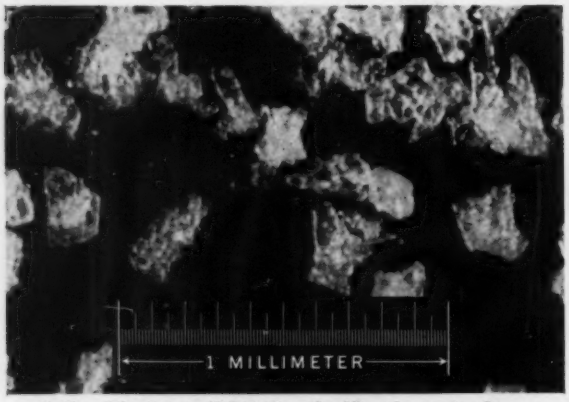
42 Mesh.....Trace	200 Mesh.....35.0%
100 Mesh.....5%	325 Mesh.....70.0%
170 Mesh.....20.0%	400 Mesh.....80.0%



Sodium Bicarbonate U.S.P. Fine Powdered No. 3DF for use specifically in dry powder fire extinguisher mixes, also in rubber and plastics blowing, lubricant for sheet vinyl.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

170 Mesh.....Trace	325 Mesh.....25.0%
200 Mesh.....2.0%	400 Mesh.....45.0%



Sodium Bicarbonate U.S.P. Granular No. 5 for use in effervescent salts, other pharmaceuticals and special types of cleansers.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh.....Trace	100 Mesh.....92.5%
65 Mesh.....27.0%	170 Mesh.....99.0%
80 Mesh.....66.5%	

Sodium Bicarbonate U.S.P. Treated Free-Flowing for use in fire extinguishers and sponge rubber.

TYPICAL SCREEN ANALYSIS
CUMULATIVE PERCENT RETAINED BY

42 Mesh.....Trace	200 Mesh.....35.0%
100 Mesh.....5%	325 Mesh.....70.0%
170 Mesh.....20.0%	400 Mesh.....80.0%

Are you getting sodium bicarbonate of the specific grain size for optimum results in your process or for maximum shelf life and performance of your products? You can eliminate doubts by specifying Church & Dwight. This simple step will assure you of obtaining the widest selection of grain sizes available because Church & Dwight is the country's largest supplier of Sodium Bicarbonate U.S.P. You'll also receive for the asking unmatched technical service based on more than 100 years of experience with sodium bicarbonate. Unusual grain size requirements are given special attention. Try us and see.

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Market Newsletter

CHEMICAL WEEK
January 21, 1961

Chemical marketing moral for January: "It's easier to cut prices than to raise them."

Most recent example, of course, is polyethylene. Du Pont attempted to hike tags 2½¢/lb. last week (Effective Feb. 1). But industry leader Union Carbide would not go along with the move, notified customers that it would stick with the lower prices it initiated months ago (*CW, Aug. 20, '59, p. 22*).

Although many producers would like to raise prices (to offset increasing costs) PE, as with many other chemicals, is plagued by overcapacity, with a large number of producers competing for the market. And these firms know only too well that despite higher posted tabs, lower-priced material would find its way to market. Result: prices would be driven down to the same levels prevailing before an increase.

Polystyrene price hikes were also stopped cold this week. Monsanto's new, revised, lower price schedule goes into effect this week. Major changes: (1) price decreases through elimination of direct-shipment discounts for crystals, natural and color; (2) introduction of a volume color category to compete with Dow's VIP colors (*CW, Jan. 7, p. 31*). Tags are 2¢/lb. higher than for crystal or natural, but 1¢/lb. under Dow's VIPs (3) elimination of charge for 1,000-lb. container (equivalent to ½¢/lb.); (4) additional discounts for hopper-car (100,000-lbs.) purchases. At this volume polystyrene will be 16¾¢/lb. Major producer Dow is studying the situation, but it's likely that the schedule will be adopted by the industry.

•

Texas Gulf Sulphur has joined the ranks of sulfur producers who have revised their competitive allowances along the Atlantic seaboard and at Tampa, Fla., in line with recent price increases by Pan American Sulphur (*CW Market Newsletter, Dec. 24, '59*).

•

Startup of new benzene plants will be one of the continuing news areas during '61, owing to last year's construction activity. One of the first units to go onstream this year is Signal Oil and Gas Co. (Houston, Tex.), whose Hydeal unit at Houston, Tex., started up about the first of the year, is now turning out specification-grade benzene. Besides being able to produce 17 million gal./year of benzene, the company can use the unit to produce 40 million gal./year of naphthalene. However, such a switch, if it occurs at all, is believed at least a year away (*CW, Dec. 10, '60, p. 85*).

Meanwhile, nearing production status is South Hampton Co. at Silsbee, Tex. It started up its Hydeal unit last fall (*CW Business Newsletter, Sept. 17, '60*), but trade reports indicate that startup problems have plagued its unit, which has an output potential of 6 million gal./year of benzene.

Calcium carbonate is now being produced in Vietnam by privately owned Kien-Thanh Co. The pulverized product, obtained from local pink calcite deposits, is used as a soil compensator and as an additive for the local rubber manufacturing industry. France's Michelin is building a tire and inner-tube plant near Saigon. According to Kien-Thanh, production will ultimately reach 150,000 tons/year.

•

Japanese fertilizer manufacturers have turned down a Chinese Communist bid to buy 150,000 tons of fertilizer (for delivery to Tientsin) before the end of March (*CW Technology Newsletter, Jan. 14*). Reason: the Chinese Communists' bid was $6/ton below the official Japanese price of $40.50/ton. The Japan Fertilizer Export Assn. indicates that it would not be possible to sell to the Chinese at lower prices than those now being charged to other Asian countries, which will buy about 800,000 tons of material during the current fertilizer year. The reported curtailment of U.S. offshore procurement was thought to be one reason behind the Chinese offer (*see p. 25*).

•

British plastics sales increased 9.3% in '60 over the '59 level, to an estimated volume of 547,000 long tons, according to a survey by the British magazine *Plastics*. Most of the gain came in packaging, transportation and houseware applications.

The increase was somewhat disappointing, however. The industry was hoping for another spurt, comparable to the 20% increase it experienced in '59 over the previous year. But setbacks in the British motor and consumer durables industry during the latter part of '60 slowed plastics' growth rate.

Another damaging factor was imports, which skyrocketed 72% during the year, from 54,483 l.t. in '59 to 93,500 l.t. last year. Most of the influx of material came from the U.S., with the largest increase noted in polyvinyl chloride. About 28,000 l.t. of PVC were landed—more than double the '59 rate. The heavy import situation was one of the factors in recent price cuts on British plastics (*CW Market Newsletters, Jan. 7 and 14*). Meanwhile, exports were up, increasing 9%, to 171,500 l.t.

•

The strike of New York railroad tug and ferry employees is beginning to affect chemical movements in the port area. Virtually none of the export freight is getting to ships and some companies have begun routing their export and coastal shipments to other ports such as Philadelphia and Baltimore.

SELECTED PRICE CHANGES—WEEK ENDING JANUARY 16, 1961

	Change	New Price
UP		
Coconut oil, crude, tanks, Pac Coast	$0.00375	$0.1175
Tung oil, tanks, domestic	0.015	0.235
Tallow, edible	0.00375	0.09375
DOWN		
Copra, Atl., Gulf ports, c.i.f., ton.	$5.00	$160.00
Cubeb oil, cns.	0.25	8.75

All prices per pound unless quantity is quoted.

Which of these 3 products and services can you use from BECCO?

TECHNICAL BULLETINS DESCRIBING H_2O_2

We got 'em—
You can have 'em—
They're FREE!

Years of experience in working with Hydrogen Peroxide have produced a wealth of information on this valuable compound, its properties, and reactions. Much of this information is available virtually exclusively from Becco. We've compiled a number of Technical Bulletins, which are yours free on request. Simply decide which ones you want, and mail the coupon below.

No. 2—Hydrogen Peroxide (general information)

No. 41—Becco H_2O_2 35% HP (high purity)

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Where can you use these *other* Becco PEROXIDES?

By "other", we mean "Other than Hydrogen Peroxide". Lots of otherwise knowing people labor under the impression that Becco makes only H_2O_2. Actually, there are quite a few "other" useful peroxides in Becco's catalog, some of which are especially suited to high-temperature oxidation reactions.

Look over the list below. Give you ideas? Remind you of a problem you've got? Either way, a note to Becco will bring you more information. Or, use the handy coupon.

UREA PEROXIDE—for use in hair dyeing and cold waving, disinfectants, hypo eliminators, and as a source of water-free H_2O_2.

SODIUM CARBONATE PEROXIDE—for compounding detergents and adhesives.

SODIUM PERBORATE—for use in dyestuff development, detergents, tooth-powders; as a mild bleaching agent and cold wave neutralizer.

CALCIUM PEROXIDE—for dough conditioning and in high-temperature oxidation reactions.

MAGNESIUM PEROXIDE—an antifermentative, for compounding antacids and laxatives.

ZINC PEROXIDE—for use as a disinfectant and deodorant in dusting powders, ointments, etc.

Emery Industries, Inc.

CARLISLE CHEMICAL WORKS, INC. READING, OHIO CW

ARGUS CHEMICAL

RCI REICHHOLD

Over 100,000,000 pounds of plasticizers have been made with Becco proved-in-production epoxidation processes, using Becco H_2O_2!

Practically everyone who manufactures plasticizers is using a Becco epoxidation technique or a slightly modified version.

Since 1950 Becco has been foremost in research and development of the epoxidation of unsaturated fatty acid esters.

Take advantage of these years of experience. Write immediately, outlining your particular interest, or request a free copy of Becco Bulletin No. 69—"Epoxidation and Hydroxylation with Becco Hydrogen Peroxide and Peracetic Acid". Use the handy coupon below.

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BECCO CHEMICAL DIVISION, FMC
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New York 17, New York
Dept. CW-M

Gentlemen:
Please send me the free Technical Bulletins checked below:

☐ #2 ☐ #41 ☐ #42 ☐ #46 ☐ #70

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BECCO CHEMICAL DIVISION, FMC
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161 East 42nd Street
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☐ Becco Bulletin No. 1—"Active Oxygen Chemicals".

☐ Detailed information on _____

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New York 17, New York
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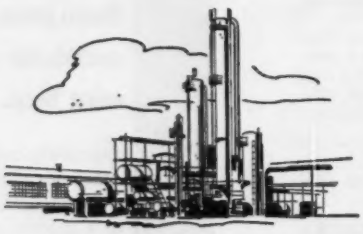
"COOLING WITH PURECO CO_2 LIQUID...

eliminated a major bottleneck"*



*This statement was contained in an engineer's report concerning the use of CO_2 as a coolant by a company that sulfunates straight chain alcohol. CO_2 sparged directly into the chemicals in the reaction tank, maintains a controlled temperature of -70° F or below. Total time for cooling *55 minutes . . . former time 3 to 4 hours.*

Perhaps Pureco CO_2 Technical Service can save your company time and money, too!

New applications for Pureco CO_2 are being found constantly . . . new ways of doing things more efficiently and economically with this versatile chemical. The engineers in Pureco's Technical Service are highly trained in the application of its many uses . . . they are ready, willing and able to discuss, demonstrate or assist in the experimental development of CO_2 applications, whether they entail a new use for the product or the improvement of an existing one.

For example:

USE PURECO CO_2 AND/OR "DRY-ICE" AS A REFRIGERANT FOR . . .

Chill grinding of heat sensitive materials.
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Freeze-drying.
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USE PURECO CO_2 AS A GAS FOR . . .

Inert blanketing of dyes, inks and other flammable mixtures.
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Distillation vehicle in distillation of phthalic anhydride in manufacture of resins.
Flushing out lacquer from TV tube interiors after optical coating.
Inert pressure medium.

USE PURECO CO_2 AS AN INGREDIENT FOR . . .

Forming carbonates, especially barium carbonates.
Manufacture of aspirin.
Controlling acidity—as in coagulating foam rubber.

Pureco is at your service. Call or write:

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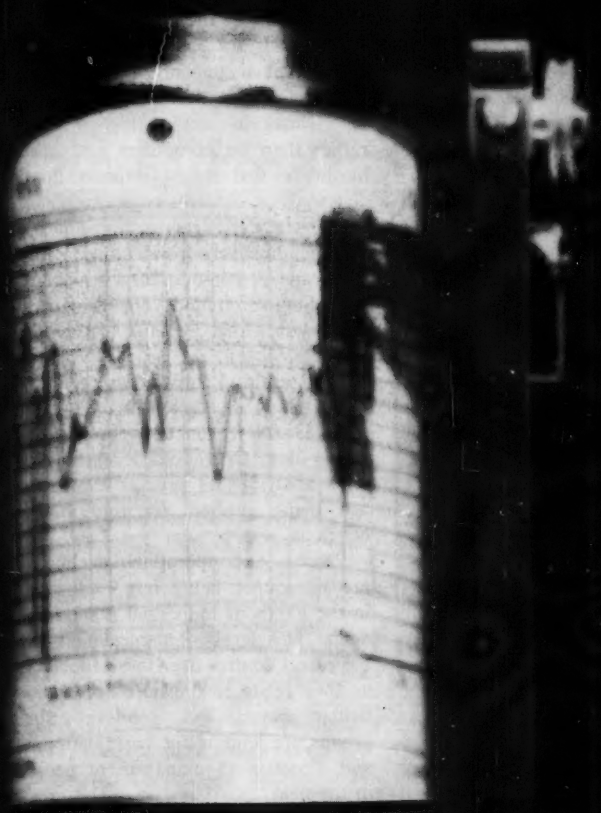
. . . is the most potent cost-cutter yet conceived. Challenge to profit-squeezed CPI management: put it to work--fast



Chemical process companies are buying instrumentation and control computers on a grand scale: in 1959, the chemical process industries spent $200 million for control equipment. Conservatives believe that spending for this purpose will increase 10%/year in the foreseeable future. Optimists put the figure at 20%, far exceeding the anticipated growth in plant investment.

These figures permit little doubt that automatic process control has arrived. Management's task now is to find effective jobs for automation — and put it to work fast.

The need for speed stems from the very nature of automation: to produce the best product most economically from an existing plant; to assure that the next plant is designed for this ideal operation — in short, optimization. Automation is the most powerful optimizing tool yet conceived. The more important the need to cut costs, the more important it becomes to optimize — and to automate.

An actual case underscores automation's prowess in squeezing the last measure of productivity out of process plants. Before computer control, B. F. Goodrich Chemical ran its Calvert City, Ky., vinyl chloride plant at efficiencies in the high nineties (CW, Mar. 5, '60, p. 35). Goodrich installed a Ramd-Wooldridge-300 computer for about $250,-

Capsule Answer To Control Problems:

Diebold's Diebold: Organize manpower starting at the top of the chart.

IBM's Taft: Long evaluation, simulation, careful computer justification.

Compudyne's Tecosky: Study dynamics of snags, then use analog control.

CW PHOTO—ED WALLOWITCH

Cyanamid's Grohskopf: Process analysis, modification, add control.

000, an investment that is paying itself out in *full* process optimization.

By permitting more accurate predictions of process performance, automation is reducing the risk of new ventures. American Cyanamid's three-year-old process analysis group under cost-conscious Herbert Grohskopf, was able to cut a plant-expansion investment estimate by 25% by figuring on the use of new analytical equipment and designing several automated process loops. The latter made possible a precise forecast of operating capabilities.

And plant performance is being evaluated sooner and in more detail than ever before: Automatic control systems allow American Cyanamid's process analysis group to use operating plants as pilot plants. Mobile data logging (*CW, Dec. 10, '60, p. 77*) is bringing the benefits of electronic brain power to plants that do not have computers of their own. Object: to gather operating data for design and performance-evaluation purposes. (Packard-Bell installed a new logger just last week.) And automation is moving directly into pilot plants (*CW, April 30, '60, p. 69*).

Takes All-Out Effort: Living with automation takes effort by everyone—from the chairman of the board, who has to give a yes or no to a million-dollar computer decision, down to the plant operator, who must broaden his skills to handle intricate control and computer systems.

But pressure for automation must come from the top, the very top. The boards of directors, executive committees, presidents and vice-presidents —the men most deeply concerned about the profit squeeze that now plagues most CPI financial statements—must initiate the steps needed to institute automation, put it to profitable use.

Before they can grasp the profound potential of automatic control, make the decisions required in this new area, top management must seek new knowledge and a new way of thinking.

Management must think quantitatively, in terms of specific costs. For automation precludes value judgments. Good or bad is no longer the question; it's how good or how bad. So management is forced to be precise in areas where, before automation, generalization was sufficient. Computers deal in numbers and specific values, not generalities.

Need for Data: Management must also have the benefit of practical statistics and other techniques of applied mathematics. The increasingly important systems approach calls for a detailed data analysis to determine just how a plant, an entire production corps, or even a whole corporation functions.

For systems analysis in depth, an understanding of mathematics, network systems, electronics, chemical engineering and mechanics is required. More and more higher-management people are becoming versed in these disciplines. To make intelligent purchasing decisions, they also should know a good deal about control systems.

All management people who influence automation decisions obviously cannot become expert in all these fields. Consequently, management must recruit these experts, rely on their counsel, open the way for them to move up in the organization.

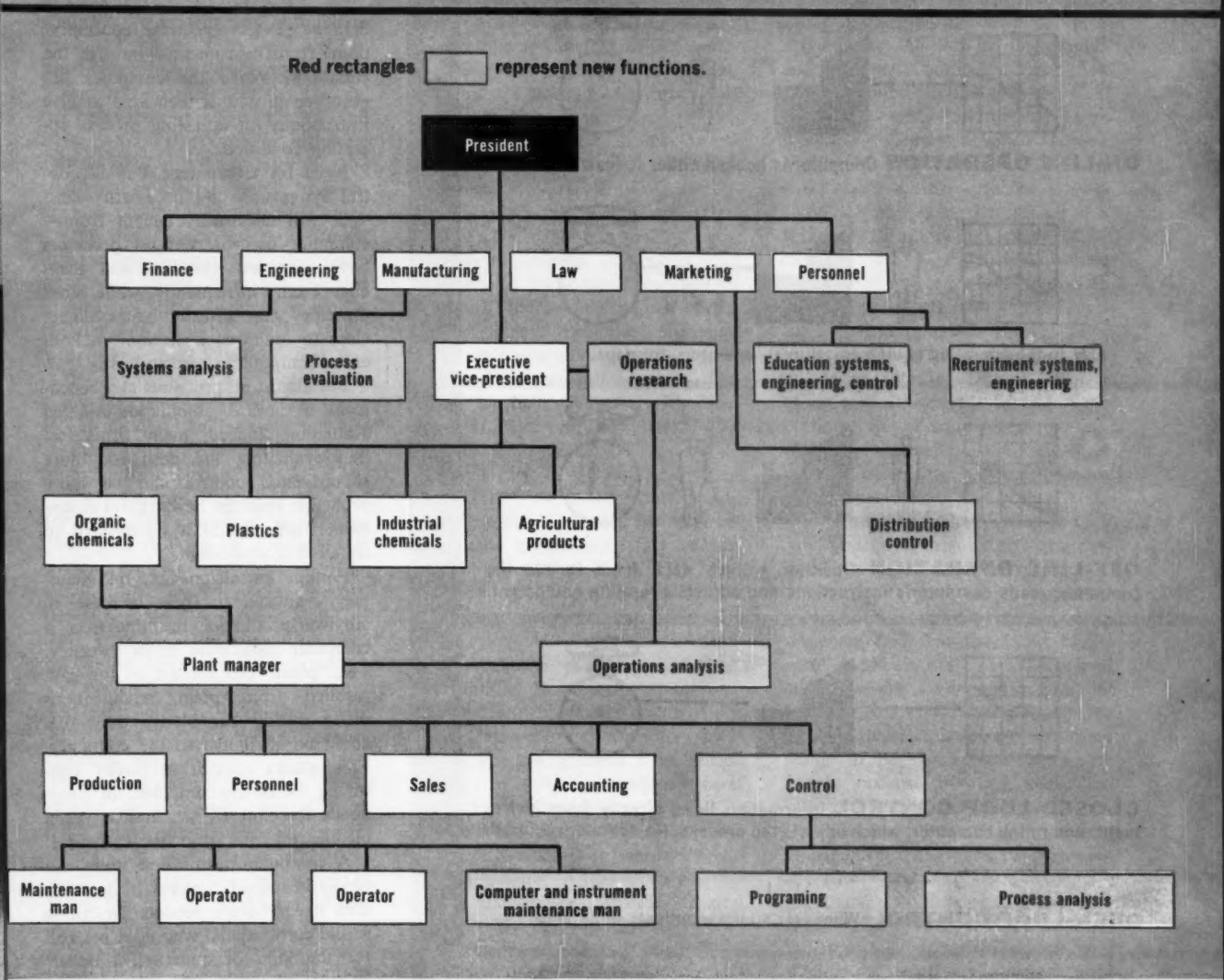
Emphasis on People: Recognizing this, top management is beginning to place more emphasis on the people who institute automating systems, rather than on computers and other hardware that might impress financial analysts. Systems engineering, operations research, process evaluation, control engineering—all these functions are becoming more important, spreading throughout operating divisions with direct impetus from headquarters.

The resulting impact on corporate organization is shown in the chart (*p. 75*). New functions are getting recognition. Operations research, systems analysis and process evaluation are being pushed up into higher echelons.

Process and operations evaluation are no longer being left exclusively in the hands of individual plant managers. This level of management still has direct control over these functions as they relate to the needs of a particular plant. But top-level staff groups are lending increasing support and direction to management people in the field.

And clear distinction must be made between the responsibilities of such overlapping groups as systems analysis, process evaluation and operations research. Since the latter is the all-

How Automation Adds to the Organization Chart



encompassing function, it will have priority—possibly operating directly out of the executive vice-president's office.

Training Course: Finding qualified people to flesh out these new organization charts is no mean task. When Monsanto Chemical started expanding its systems engineering group, it had to develop its own training course (*CW, March 21, '59, p. 73*). A year and a half of full-time study at St. Louis University was required to prepare chemical engineers for systems engineering. The background needed is typified by one of Monsanto's systems engineering leaders, T. J. Williams, who has a doctorate in chemical engineering and a master's in electrical engineering.

Because recruiting and training of systems engineers and related personnel is too imposing a task for the engineering department, it will have to be handled directly from the personnel department. This very specialized recruiting problem demands a special personnel group geared directly for the job.

Changes in Operations: Lower-level personnel functions also are changing. Automation works to optimize a plant or a business by minimizing the amount of human judgment expended. Instead of deciding how much to turn a valve in response to a temperature or level change, operators are making a different kind of decision: what to do when automatic devices "call for help." This calls for more familiarity with electronic systems and computer operation, more stress on plant maintenance.

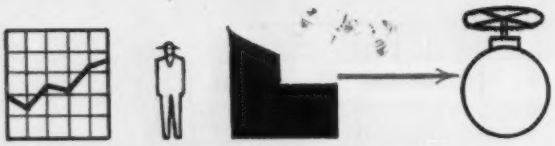
It's clear, however, that automatic process control is not reducing the operating force. In fact, at almost all the plants with closed-loop systems, manpower has increased. Open-loop systems (*see chart, p. 76*) do not even attempt to eliminate an operator.

Computer programers once were regarded to be staff, rather than line, personnel. But this relationship is blurring in the production function as well as elsewhere in the corporation. The computer is serving as a production tool, rather than as a calculating aid; its programers therefore are assuming a line function, directly turning out product.

Operators and management men both are getting a real morale boost from automation, especially complex

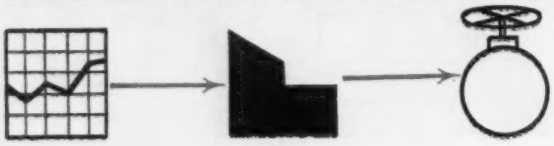
Glossary of Automatic Control

ON-LINE OPERATION Computer is hooked either to instrumentation



. . . **OR** to the operating equipment. Human operators fill gaps.

OFF-LINE OPERATION Operator gathers data, feeds it into the computer, reads computer's instructions and adjusts operating equipment.



CLOSED-LOOP CONTROL Information flows directly from instrumentation to the computer, which adjusts the process. No operator required.

OPEN-LOOP CONTROL–Whenever a human adjusts equipment.

SUPERVISORY CONTROL AND DYNAMIC CONTROL
Two new terms worth attention. Although definitions are not precise, supervisory control implies that the computer is doing what a supervisor would do: direct the work of operators making process adjustments. Dynamic control would mean that the computer actually calculates optimum process specifications besides giving directions for adjusting the process

computer setups. Much of the routine drudgery is eliminated, replaced with more challenging work.

Mysterious Computers: Computers are perhaps the most mysterious and misunderstood element of the entire automation picture. Computers have a place in chemical process control because almost all processes are not linear. Every three-degree change in stream temperature, for example, does not require an equal compensating adjustment of equipment. On the contrary, variables behave in a random, unpredictable fashion. The function of the computer is to determine what changes do have to be made to adjust operation to desired conditions.

The computer first must learn how the process should work. This means programing, or filling its memory with equations describing the process. And the computer's memory needs instructions on how to run operating data (e.g., temperatures, concentrations) from instruments—through the equations. When the computer has absorbed this, it is then able to give instructions for adjusting process operating conditions.

Need for Computers: But all control systems do not necessarily need —or will necessarily benefit from— computer control. Certain processes have very few variables and these change only infrequently, while other processes may already be extremely close to optimum operation. In both cases, computer is hard to justify.

But almost all processes can benefit from a careful automation-oriented evaluation. Indeed, many firms feel that evaluating the need for more sophisticated control can be more profitable than the new control equipment itself, should it be decided to install this equipment.

Phillips Petroleum Co., for example, evaluated a 16% increase in ethylene production resulting from a computer installation at its Sweeney, Tex., plant. Ten percent of the gain resulted from plant modifications made during the study; only 6% could be attributed to the computer. This wasn't enough to justify continued use of the computer, an Autonetics Recomp II, which was taken off the job, put to work elsewhere.

A computer justification study can be so beneficial because it demands data never before needed. Designing in the conventional way does not call for the kind of quantitative understanding of process dynamics required for computer control—and computer justification.

Simulation of process dynamics often is found to be sufficient. Analog computers hooked up to normal instrumentation are most often used for this purpose.

By evaluating fluctuations in voltages, it is possible not only to simulate the process but also to determine how another computer would control the process.

Cost Is Factor: These studies can become quite costly. Management must decide whether or not to launch a study just as it decides whether or not to research a new product or develop a process.

Even with processes that looked highly attractive for computer control, there have been installations that haven't paid off. Computers were

oversold, equipment and installation costs ran higher than expected. In some cases the justification study and trial operation data was too skimpy.

Firms have gone overboard and have purchased excessively elaborate systems only to find out later that the additional dollars generated from increased productivity weren't enough to pay out the computer investment in a reasonable time. Still other problems have arisen from overcomplex installations that required excessive maintenance.

But these are difficulties that will arise in any new field. Not only is computer control less than three years old in the chemical industry, but also chemcial plants are not ideally adapted to computer control.

Slow Process: Contrast the case for computer control of a chemical plant with that for an electric-power station. Utilities are high-investment affairs with 30-year payouts. Normal operating efficiency is very high, but any small gain is very profitable. Electronic controls are in abundance and the engineering talent on hand is very familiar with electronic systems. All these factors are foreign to most chemical operations.

Computer-control systems have caught on very well in the utility field; four systems are now being installed and eight more are about ready to leave the manufacturer. Firms like Librascope, Philco, Minneapolis-Honeywell, RCA and Westinghouse have put their process control computers in steel, oil and utility plants. But they have yet to break into the chemical industry. And dozens of analog computer manufacturers are hopefully eyeing the CPI. Automation is coming to the CPI, but slower than it has come to other industries.

The Choices: In making a choice of computer-control equipment, one test is fundamental: Will the dollar gain from optimization be enough to pay out the investment in additional control equipment in a reasonable period of time?

With relatively little thought, it can be determined whether the control system should be in the $5,000-$25,000 range or the $50,000-$300,000 range. Although there are exceptions —e.g., Information Systems' inexpensive digital computer and Leeds & Northrup's $200,000 analog computer—analogs generally are in the lower range and digitals in the upper.

"Using analogs, you can concentrate on one portion of a process at a time, build automatic process control by degrees, risk a low investment," says J. Lawrence Tecosky, executive vice-president of analog-producing Compudyne Corp. (Hatboro, Pa.).

However, digital computers can also be used for a specific portion of a process. Daystrom sells one of the few packaged computer processes, which utilizes a small special-purpose digital computer, the Flowcon. Designed by both Universal Oil Products and Daystrom, the system distills paraffins from gasoline.

About 15% of a computer installation is for new instrumentation and modifications. Goodrich, for instance, had more trouble with instrumentation at its Calvert City, Ky., vinyl chloride installation than with the RW-300 computer.

Of course, vendors selling intricate instrumentation can also install it. But installation requires an intimate knowledge of processing details. Since these details are often carefully guarded secrets, management must decide whether to install the equipment itself or let the vendor do it.

Too Many Secrets? Most chemical firms go overboard on secrecy, would do much better to sign secrecy agreements and let the instrument manufacturer do the installation. In this way, reliable operation is more likely and, should something go wrong with the equipment, the vendor is responsible for its correction. Management could concentrate on seeking out new instrumentation and choosing between alternate control schemes, rather than worry about installation and potential maintenance problems resulting from "do it yourself" errors.

Suppliers realize the problems connected with computer-instrumentation tie-ups, realize that computer control and instrumentation are part of the same problem. So firms manufacturing instrumentation and those making computers have been getting together. Working agreements exist between Foxboro and RCA, Leeds & Northrup and Philco, Packard-Bell and Bailey Meters. Two mergers have resulted from this line of thinking: Information Systems is now part of Chance Vought; and Control Data Corp. has acquired Control Corp.

Hardware: Makers of instruments and computers both are doing their share to spur automation in the CPI.

Just this week, Perkin-Elmer Corp. (Norwalk, Conn.) unveiled a new high-speed chromatograph. IBM is ready with a new process control computer, now being hooked up to a Standard Oil (Indiana) plant (*CW, Oct. 22, '60, p. 31*). IBM is also coming out with a converter to switch analog-type signals into suitable form for digital computers.

Perkin-Elmer cut the analysis time on its gas chromatograph down to as little as 30 seconds for some operations. Key change: use of pneumatically actuated valves instead of valves driven by electric motors. Foxboro is coming out with a complete chromatograph-sampling in mid-'61. And Greenbrier is planning new developments in chromatography.

The trend is to use of more and more analysis equipment as process designers find that the "four horsemen"—temperature, pressure, level and flow—are not enough to fully define and control a system. Within the field of analysis equipment, the trend seems to be toward gas chromatographs because of their versatility, over-all low cost and reliability.

Action-Reaction: But chemical management's response to these enthusiastic instrument and computer manufacturers is varied; often men within one firm oppose each other. Du Pont feels partial to analog computers and small digitals to control specific portions of a process. Sun-Olin's leader in systems planning, Eric Weiss, has a similar feeling, says, "As yet, we can solve our control needs in a big way with small, low-investment equipment."

Harry Moore of Esso Research says, "When you're talking about automatic process control, the first word is hold off on computers. Instrumentation—the development of well-instrumented processes—takes precedence."

It's easy to explain this mixed reaction: some firms have been hurt by large expenditures for intricate systems that just aren't economical; others have had tremendous success, paying out a $250,000 investment in two years.

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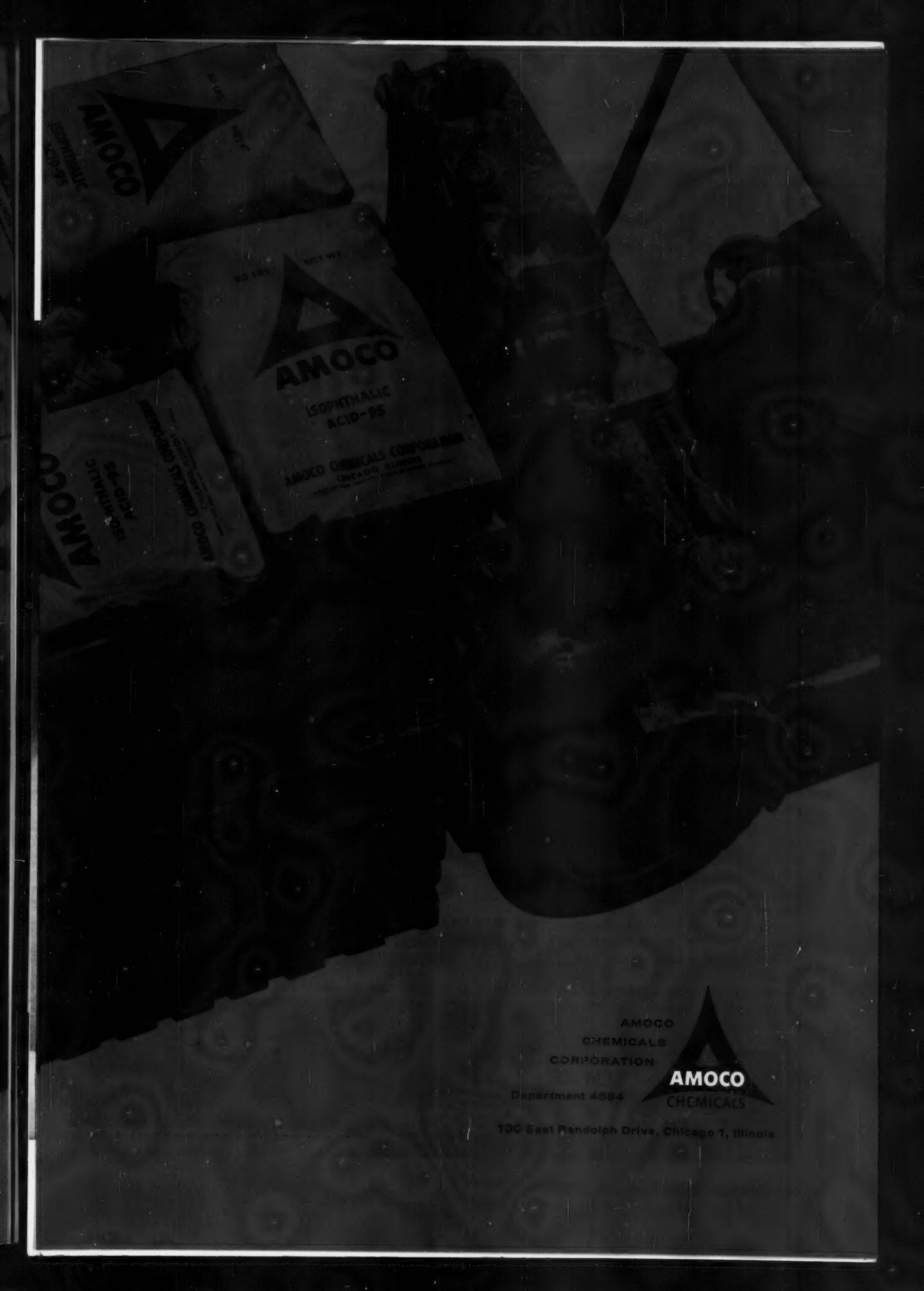
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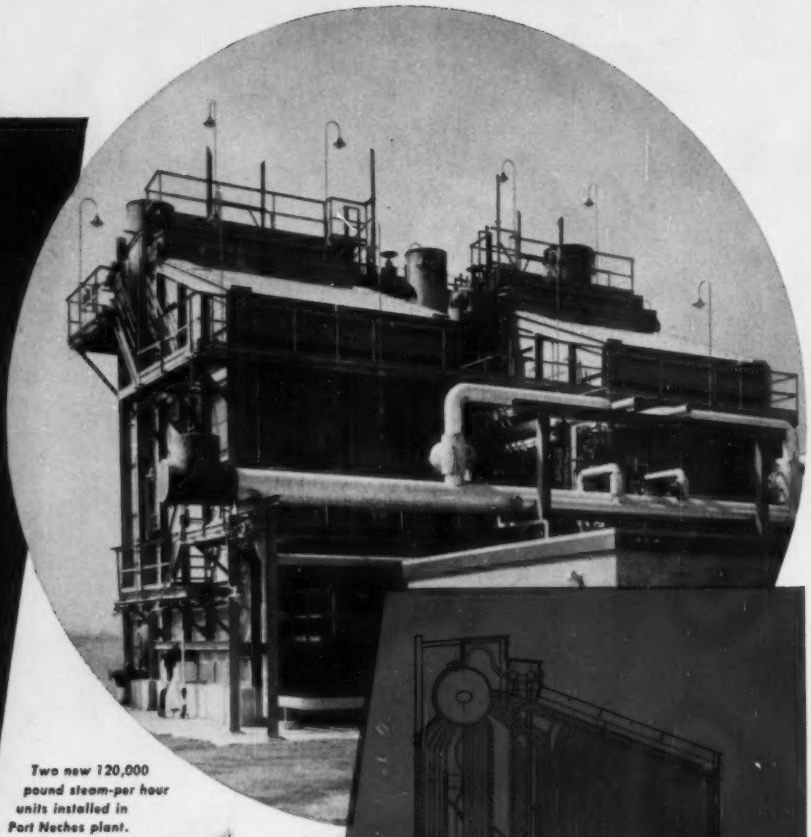

Two new 120,000 pound steam-per hour units installed in Port Neches plant.

The needed additional power and process steam capacity for Jefferson Chemical's expanded Port Neches plant is furnished by the two Vogt boilers pictured here, each with a capacity of 120,000 pounds per hour. The boilers are designed for 675 lbs. pressure to operate at 625 lbs. pressure and 769°F. total temperature. The furnaces are equipped with gas burners and have water cooled front and side walls.

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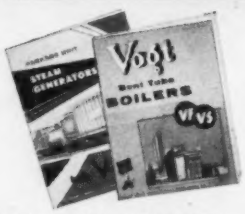

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Squibb's Toohy and Governor Meyner dress for plant inspection.

Curing Jersey's Drug Ills

In his "state-of-the-state" message to the New Jersey legislature Governor Robert B. Meyner last week proposed sweeping changes in food and drug laws that could affect all the state's drug manufacturers. Heart of the change: mandatory licensing of all manufacturers and wholesale distributors of ethical and proprietary drugs.

The action culminates several months of industry and official state activity on the matter. This activity grew out of a raid last summer (*CW, Aug. 20, '60, p. 45*) on a Jersey firm, alleged to be counterfeiting ethical drugs of several leading drug companies. The reputable companies involved in the counterfeiting case at that time offered their assistance and support to the state's Food and Drug Bureau in tightening regulations.

Progress Made: Industry has already given support in two ways. Several of the larger companies have taken pains to show state officials how they maintain standards of drug manufacturing and quality control. For example, Olin Mathieson's Squibb Division invited Governor Meyner to dedicate a new plant as part of the industry's day-long education program for state government officials.

Top drug companies also supported passage of a bill last year that will raise the penalty for counterfeiting drugs and make distributors of the counterfeited drugs open to prosecution on the charge. Having been passed by both houses of the state legislature, the bill now awaits the governor's signature.

Proposed Legislation: The newest proposal for regulation of drug manufacture, now in rough draft, is being reviewed by the state attorney general's office and the state board of health. When the final version has been drawn the governor will call in the leading pharmaceutical houses, ask for their comments and assurance that they won't oppose it when it is presented to the legislature (probably late in February). The legislation is aimed primarily against "fly-by-night" operations, will contain no bureaucratic red tape that would hinder responsible companies.

Indications are that the law will have "teeth" in it. The bill would require licensing, probably through the state health department, of all pharmaceutical manufacturers and wholesalers. Doctors and pharmacists would be exempt, unless their volume of business qualified them as wholesalers. Standards would be centered around quality control, manufacturing, proper sanitation and qualified supervisory personnel, possibly include adequate building and grounds for conduct of business, proper branding and labeling.

The bill will likely provide for periodic inspection of drug manufacturing facilities with revocation of license to be the most severe penalty. (New York and California have rather liberal laws. Connecticut and Pennsylvania require licensing of drug manufacturers.)

Summing up the state's position, New Jersey's health chief, Milton Ruth, says, "A law requiring the licensing of drug manufacturers and wholesalers is one of the most needed health laws in New Jersey. This legislation will provide the tools necessary to better control manufacturing standards and protect public health in the state."

Industry Reception: Leading pharmaceutical companies with operations in New Jersey are unanimously favorable to Governor Meyner's call for a tightening of the food and drug laws.

T. F. Davies Haines, president of Ciba Pharmaceutical Inc., puts it this way: "The New Jersey drug firm that was reported to have netted $50,000 a month in 'backdoor' counterfeit sales while its 'frontdoor' operations turned out . . . generic drugs in filthy conditions for years would not have endangered the public health one week if there had been more stringent and adequately enforced control measures." Squibb's General Manager J. J. Toohy believes that proper legislation would go a long way toward protecting both manufacturers and consumers.

Several companies point out that any realistic licensing legislation would be of greater assistance to responsible manufacturers than it would be an administrative burden, when the sales dollars and prestige lost because of counterfeiting are taken into consideration.

The only point of reservation among some producers is that a new law might present a conflict between state and existing federal jurisdictions. Aside from this, Jersey drugmakers generally will welcome the new state law.

Sighting Small Investments

Small-business investment companies are growing fast, and embryonic or established small chemical companies or specialty makers can be expected to look to them more and more as a source of financing.

Figures released last week by the Small Business Administration show that the small-business investment company (SBIC) is one of the fastest-growing sources of capital for the little entrepreneur. SBICs, under the Federal Small Business Act of 1958, are privately organized—though fostered by U.S. funds—to provide venture equity and loan capital to companies with total assets of less than $5 million, net worth of under $2.5 million and average after-tax earnings of less than $250,000 over the most recent two business years.

Robert Lenehan (*picture*), chief of SBA's New York regional investment division—one of 15 regional divisions and among the fastest growing in terms of SBICs formed—reports that since the '58 act was liberalized last July the number of SBICs in the U.S. has risen sharply—from about 100 at the end of May to 171 Dec. 31, 175 by Jan. 6, with 91 more being cleared.

The SBA program is so new, only now gaining any stature, says Lenehan, that many chemical firms or entrepreneurs in the small category haven't become aware of its possibilities.

Interest: That view seems to be borne out in CHEMICAL WEEK's talks with chemical specialties makers and small process firms. Said the finance officer of an aerosol firm, "I wish SBICs had existed when we got started." He pointed out that it's often a tough job for small companies to raise capital from banks or individual sources, and that SBICs could help fill that gap.

Most processors feel that any small chemical producer seeking additional capital today, or hoping to start a business, should include SBICs on his list of financial sources. However, while they believe SBICs can be good money sources, many object that thus far SBIC investments have leaned heavily toward electronics and its glamorous prospects.

"They'll get over that fairly quickly, though," says an officer of one bank that likes to finance small ventures. "As soon as electronics shakes out, the SBICs will be around looking for any of the conventional business they can find, and chemicals are a hot prospect."

A dozen or so SBIC companies have shown their interest in chemical process ventures, either by investing in the CPI or by the language of their charters or by the men they include on their staffs.

Newest chemical business to receive SBIC backing is Magna-Bond, Inc., underwritten by American Diversified Securities, Inc. It's now marketing $300,000 of common stock to back its venture in protective coatings. And in Columbus, O., Techno Fund, Inc.,* one of the fastest growing—with investments of $4.8 million in 12 firms in a year's time—backs up its contention that it is specializing in investments in electronics, chemicals, "new" metals, instruments, and unusual mechanical products by staffing one vice-presidential office with Kermit Herndon, former vice-president of Olin Mathieson's Energy Division, and the chairmanship and another vice-presidency with two former top officers of Battelle Memorial Institute, Clyde Williams and Bruce Robe, respectively.

Such SBICs are looking forward to more business in the chemical line. For small chemical makers needing fresh financing, SBICs may soon be proving a useful source.

* Others: Growth Capital, Inc. (Cleveland); Franklin Corp. (New York); Growth Ventures, Inc. (Newark, N. J.); Alar Small Business Investment Corp. (New York); Agri Supply Finance Co. (Lathrop, Calif.); Royal Small Business Funds, Inc. (New York); Texas Capital Corp. (Austin, Tex.); Empire SBIC (New York).

CW PHOTO—WM. ROSENBLUTH

Regional Chief Lenehan keeps tab on investments in small firms.

LABOR

Uranium Election: After seven National Labor Relations Board elections, employees at Vanadium Corp. of America's Durango, Colo., uranium processing plant have voted for union representation. The vote was 174 for District 50, United Mine Workers, 49 for no union, one for the Teamsters, and none for the Hod Carriers. The unit includes production, maintenance and service department employees, truck drivers, warehousemen and laborers. Guards and office and clerical workers were excluded.

•

Kanawha Drive: In the Kanawha Valley of West Virginia, the Oil, Chemical & Atomic Workers union has renewed its efforts to represent a broad segment of employees in the huge chemical complexes there. It has opened a three-prong attack that could involve more than 6,200 employees.

First the union is aiming to organize the South Charleston plant of Union Carbide. Last month Carbide turned down an OCAW petition for recognition as bargaining agent for hourly employees. Since then the National Labor Relations Board has

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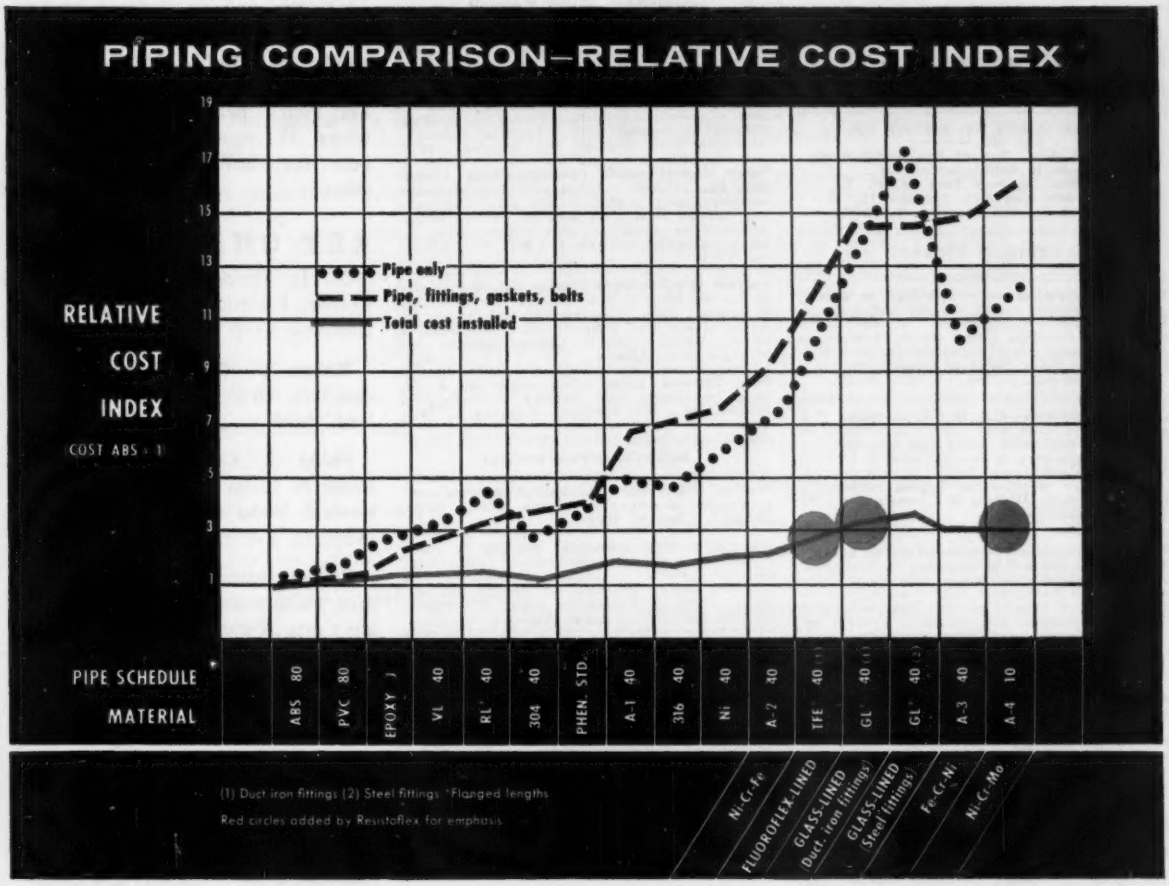

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scheduled an informal conference between the union and representatives of the South Charleston plant.

Meanwhile, OCAW has opened a drive to organize several hundred production and maintenance workers at Goodrich-Gulf Chemical Co.'s Institute plant. And OCAW is scheduled soon to begin organizing efforts at Du Pont's Belle, W. Va., Works, where 15 organizing attempts have been successfully stemmed in past years.

KEY CHANGES

M. L. Slesinger to vice-president Textile Chemical division, Dexter Chemical Corp. (New York).

Robert B. Bennett to board of directors, Dow Chemical Co. (Midland, Mich.).

Philip J. Canepa to secretary, **Dante N. Biello** to assistant treasurer, **Louis J. Weisz** to assistant secretary, Industrial Rayon Corp. (Cleveland).

Russell Brittingham to vice-president, manufacturing, Pittsburgh Corning Corp. (Pittsburgh).

Frank R. Denton and **George D. Woods** to board of directors, Pittsburgh Plate Glass Corp. (Pittsburgh).

William N. Davies to vice-president, sales, Interchemical Corp. (Hawthorne, N. J.).

John A. Rodda to assistant to the president, Food Machinery and Chemical Corp. (San Jose, Calif.).

Raymond S. Chase and **Werner Ostberg** to vice-presidents, marketing and operations, respectively, Dundee Cement Co. (Toledo).

Paul F. Wilke to comptroller and board of directors, Inter-Coastal Paint Corp. (East St. Louis, Ill.).

Gilman S. Hooper to director of research, Fiber Development Dept., Hercules Powder Co. (Wilmington, Del.).

Thomas W. Childs and **Wallace MacGregor** to board of directors, American Metal Climax, Inc. (New York).

E. C. Slaght, Jr. to vice-president, technical director, Newport Industries Division (Pensacola, Fla.), Heyden Newport Chemical Corp.

Chemical Week

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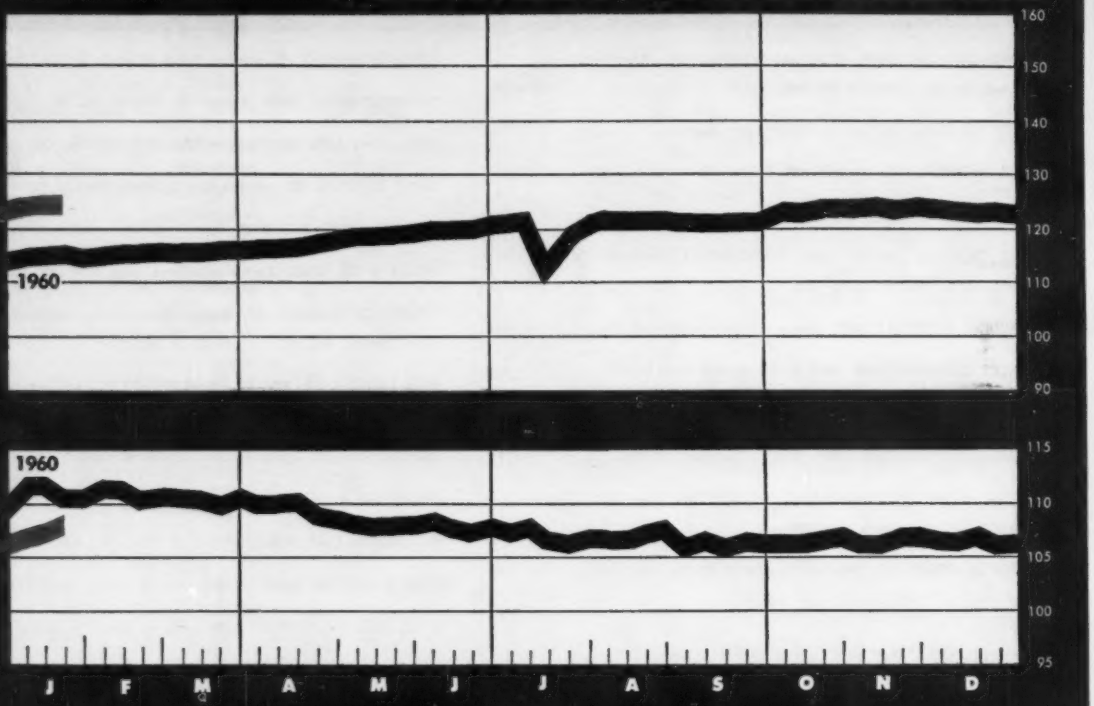

JANUARY 21, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	124.8	124.6	116.9
Chemical Week wholesale price index (1947=100)	108.4	107.9	112.6
Stock price index (12 firms, Standard & Poor's)	48.90	47.55	59.92
Steel ingot output (thousand tons)	1,361	1,103	2,715
Electric power (million kilowatt-hours)	14,245	13,956	14,308
Crude oil and condensate (daily av., thousand bbls.)	7,164	7,172	7,111

PRODUCTION INDICATORS (1957=100, unadjusted)	Latest Month	Preceding Month	Year Ago
All manufacturing	106	110	104
Nondurable goods manufacturing	113	118	113
Durable goods manufacturing	101	104	97
Chemicals and allied products	123	121	117
Industrial chemicals	125	126	123
Petroleum and coal products	105	109	104

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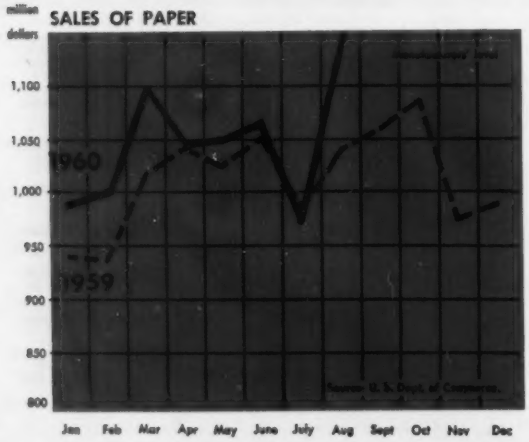

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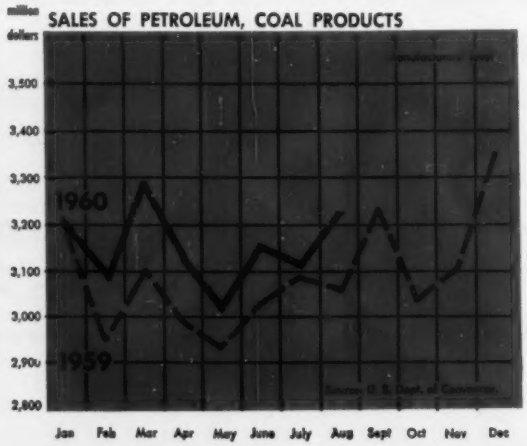

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PETROCHEMICALS DEPARTMENT, GULF OIL CORPORATION, PITTSBURGH, PENNSYLVANIA

Allied Chemical announces 50% boost in HF capacity at Nitro, W. Va. plant

NITRO, W. VA., March, 1960—Allied Chemical's General Chemical Division announced today that it has expanded by more than 50% the productive capacity of its anhydrous hydrofluoric acid plant at Nitro, West Virginia. This is one of several developments which strengthen Allied Chemical's position in fluorine chemicals. The Company has also recently acquired more than one million tons of additional fluorspar reserves.

B & A opens new facilities for Electronic Chemicals at Los Angeles

LOS ANGELES, June, 1960 – General Chemical today opened extensive new production and packaging facilities for its line of Baker & Adamson "Electronic Grade" Chemicals at nearby El Segundo to serve the booming West Coast electronics industry.

GENERAL CHEMICAL LIQUID ALUM PLANT "ON STREAM" AT EL SEGUNDO, CALIF.

LOS ANGELES, July, 1960—General Chemical has completed its newest facility for production of liquid aluminum sulfate at El Segundo, California. This is General Chemical's twenty-ninth plant providing dry or liquid alum for pulp and paper manufacture, water and sewage treatment and other uses.

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General Chemical continues to grow in order to serve industry's growing needs. This is evidenced by the many new plants and facilities we started or completed during 1960. From them will come increased production of the products highlighted here . . . other basic and special chemicals, too!

Promise of further growth is also inherent in the substantial expansion of our Research Laboratory at Morristown, New Jersey, which will be completed this year.

To learn more about the broad range of products we are geared to serve you with in the soaring 60's, write today for our free new brochure "Chemicals For Industry." Business letterhead, please.

Top quality phosphoric acid soon to flow from new General Chemical plant at E. St. Louis, Illinois

ST. LOUIS, December, 1960—General Chemical reported today that its new wet-process phosphoric acid plant at E. St. Louis, Illinois, is rapidly nearing completion. Important engineering advancements will permit production of finer quality green phosphoric acid than any presently available. Substantial savings are forecast for users because the new product is cleaner, freer from solids, and easier to use.

1/3 INCREASE IN "GENETRON" CAPACITY TO COME FROM NEW GENERAL CHEMICAL PLANT IN ELIZABETH, NEW JERSEY

NEW YORK, N. Y., October, 1960—A third plant to produce its "Genetron" line of fluorinated hydrocarbons is now being built by Allied Chemical's General Chemical Division in Elizabeth, N. J., to serve East Coast refrigerant and aerosol propellant users.

Allied Chemical

GENERAL CHEMICAL DIVISION

40 Rector Street, New York 6, N. Y.

Basic to America's Progress